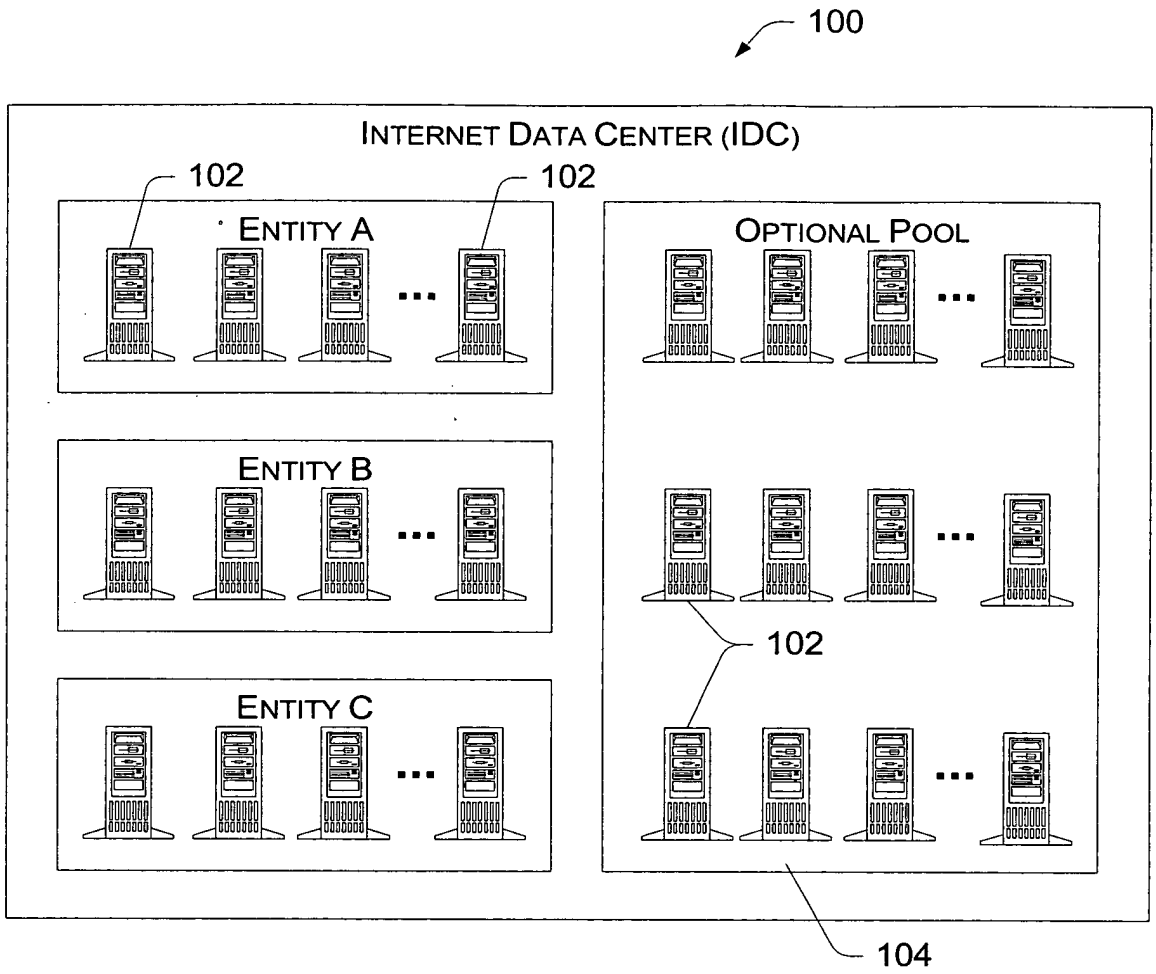

100
INTERNET DATA CENTER (IDC)
102
102
ENTITY A
OPTIONAL POOL
ENTITY B
102
ENTITY C
104

Fig. 1

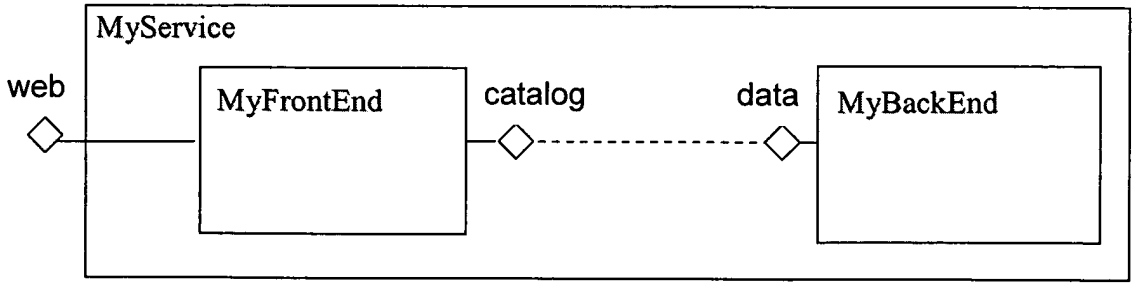

MyService
web
MyFrontEnd
catalog
data
MyBackEnd

Fig. 2

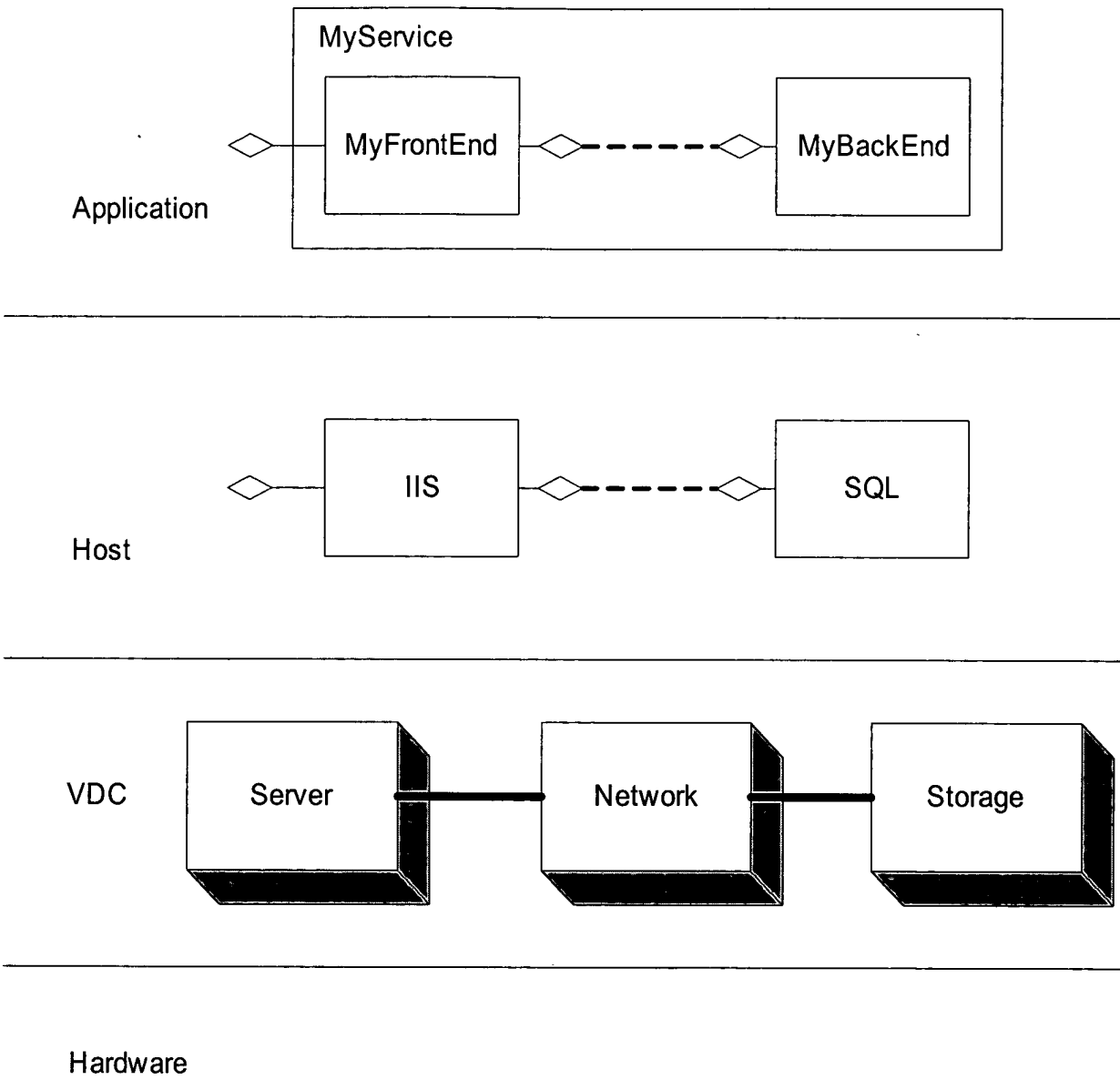

MyService
MyFrontEnd
MyBackEnd
Application
IIS
SQL
Host
VDC
Server
Network
Storage
Hardware

Fig. 3

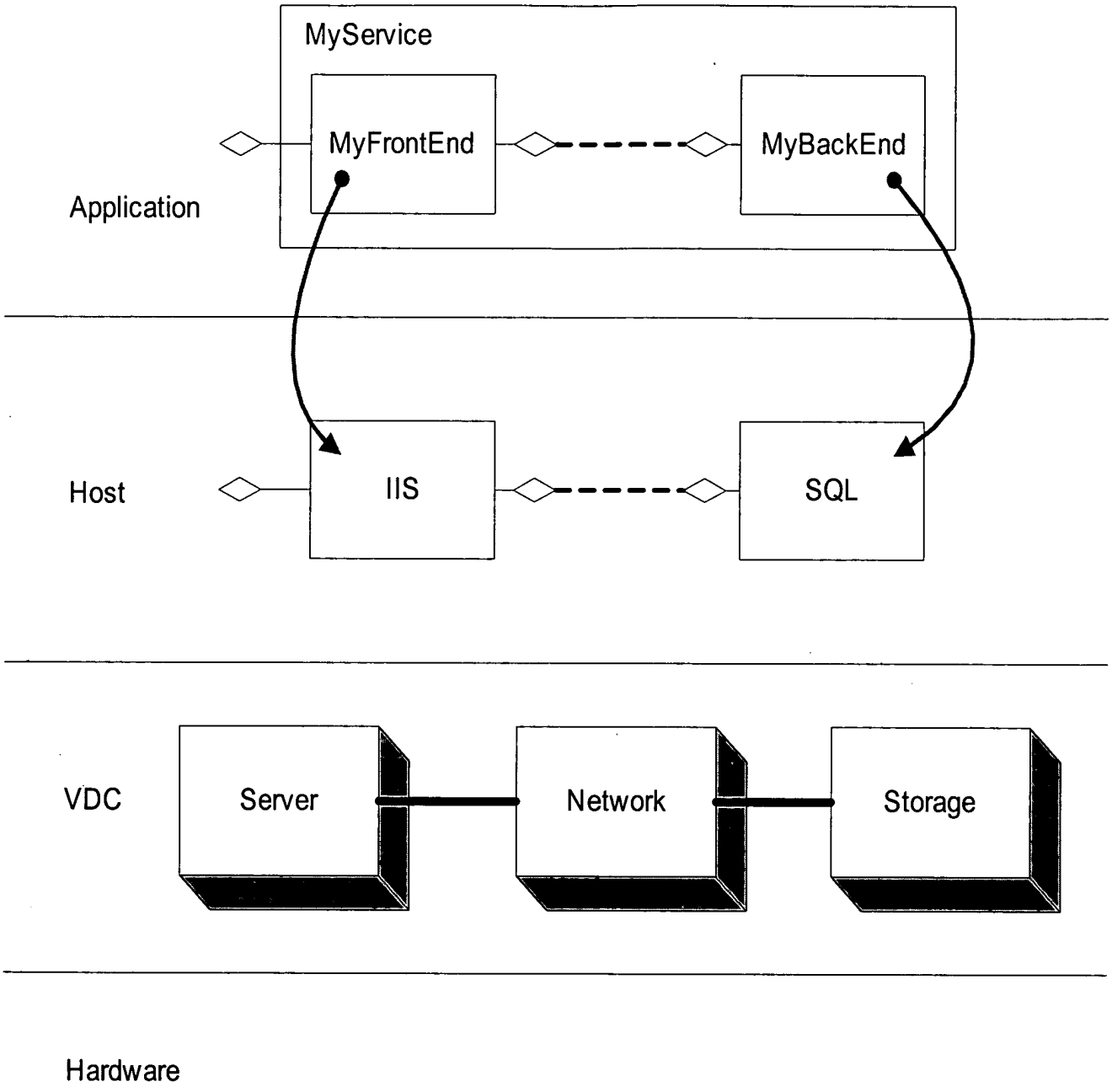

MyService
MyFrontEnd
MyBackEnd
Application
Host
IIS
SQL
VDC
Server
Network
Storage
Hardware

Fig. 4

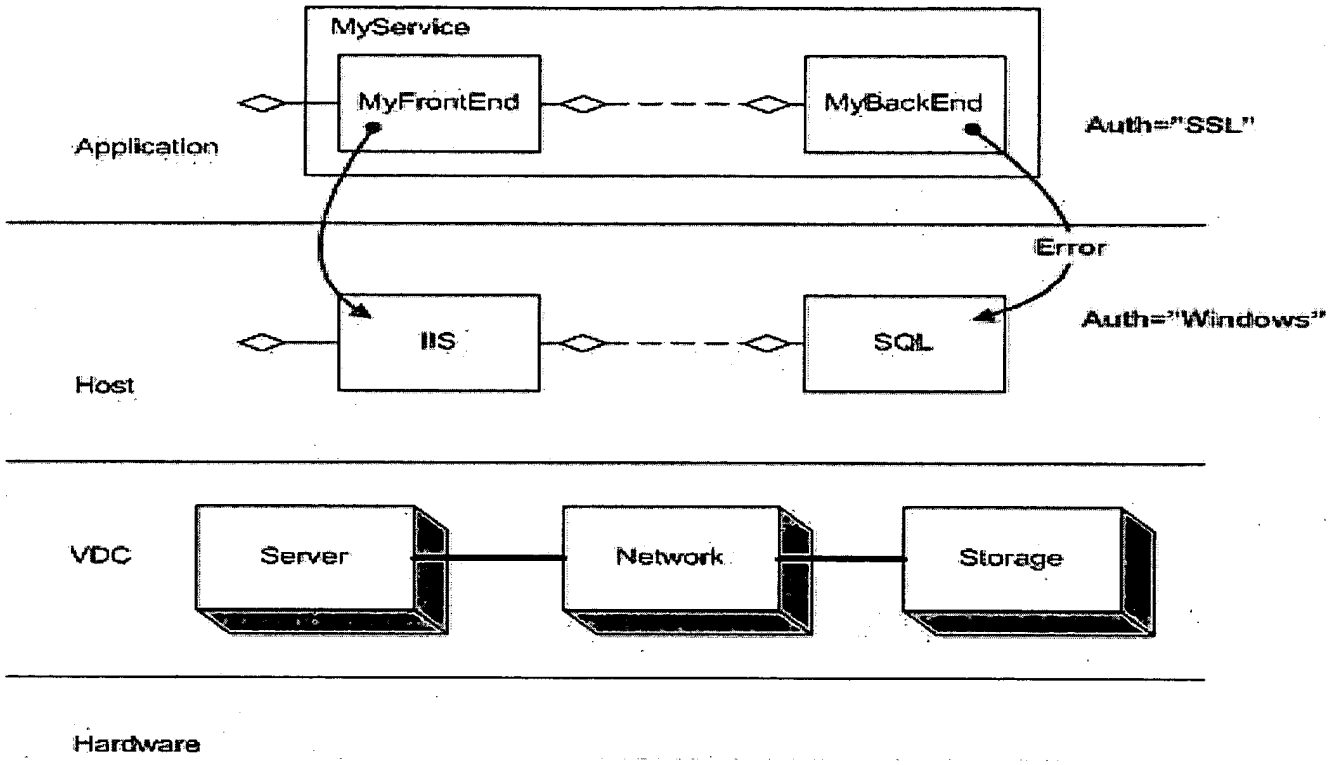

MyService
MyFrontEnd
MyBackEnd
Application
Auth="SSL"
Error
IIS
SQL
Auth="Windows"
Host
VDC
Server
Network
Storage
Hardware

Fig. 5

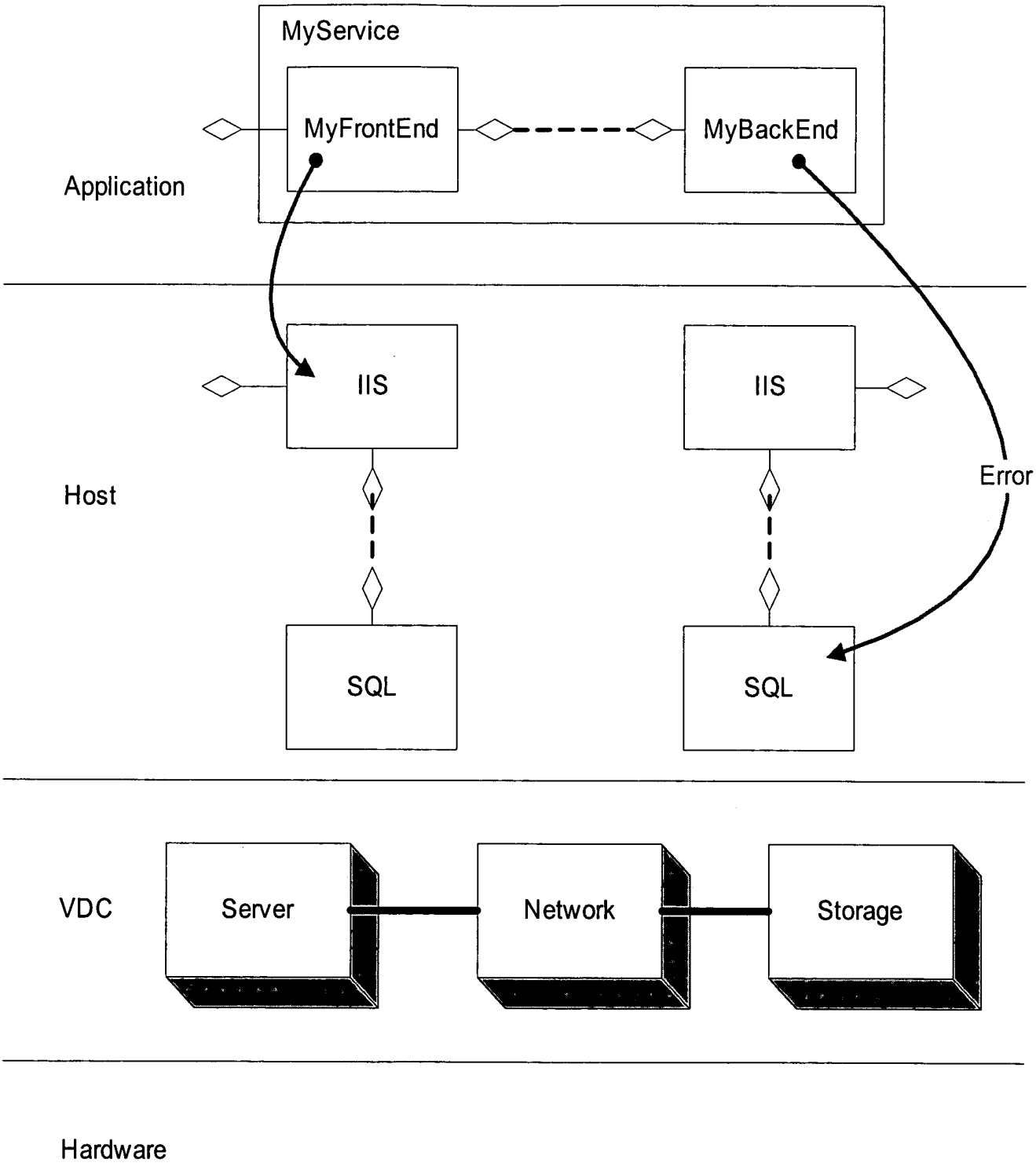

MyService
MyFrontEnd
MyBackEnd
Application
IIS
IIS
Host
Error
SQL
SQL
VDC
Server
Network
Storage
Hardware

Fig. 6

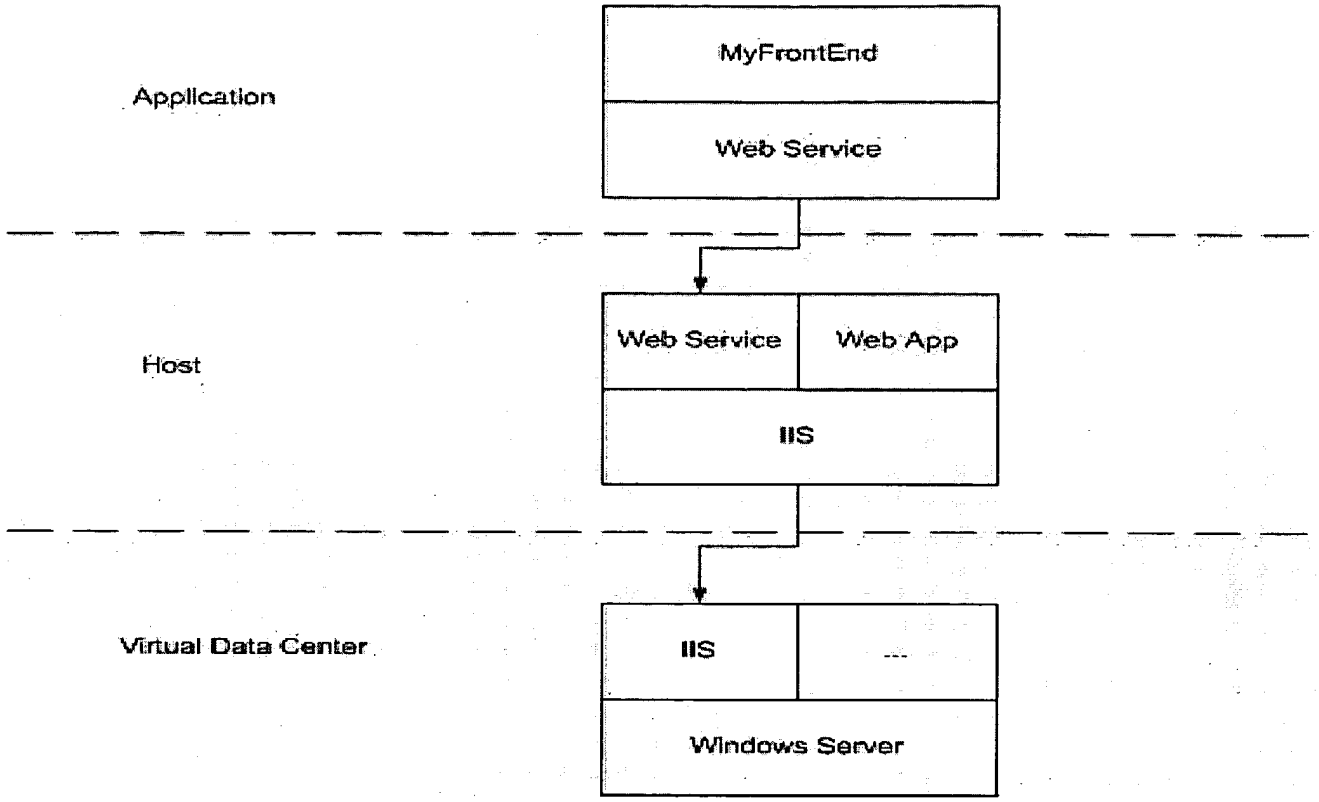

Application
MyFrontEnd
Web Service
Host
Web Service
Web App
IIS
Virtual Data Center
IIS
...
Windows Server

Fig. 7

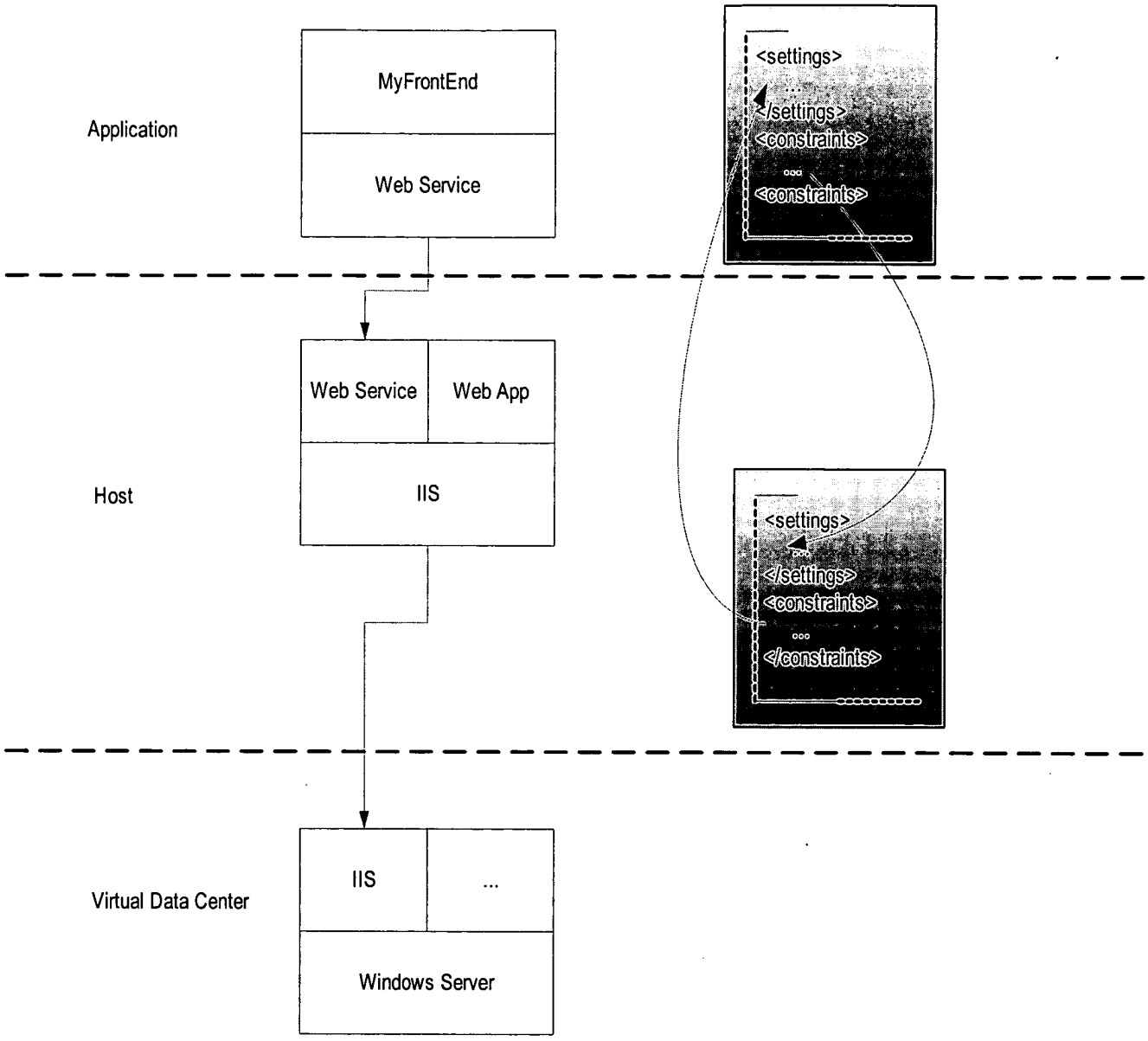

Application
MyFrontEnd
Web Service
<settings>
...
</settings>
<constraints>
...
<constraints>
Host
Web Service
Web App
IIS
<settings>
...
</settings>
<constraints>
...
</constraints>
Virtual Data Center
IIS
...
Windows Server

Fig. 8

Settings Schema	Deployment Manifest	Port Implementation Reference

Fig. 9

Settings Values	Deployment Values	Constraints Values	Port Types or Hosted Type List

Fig. 10

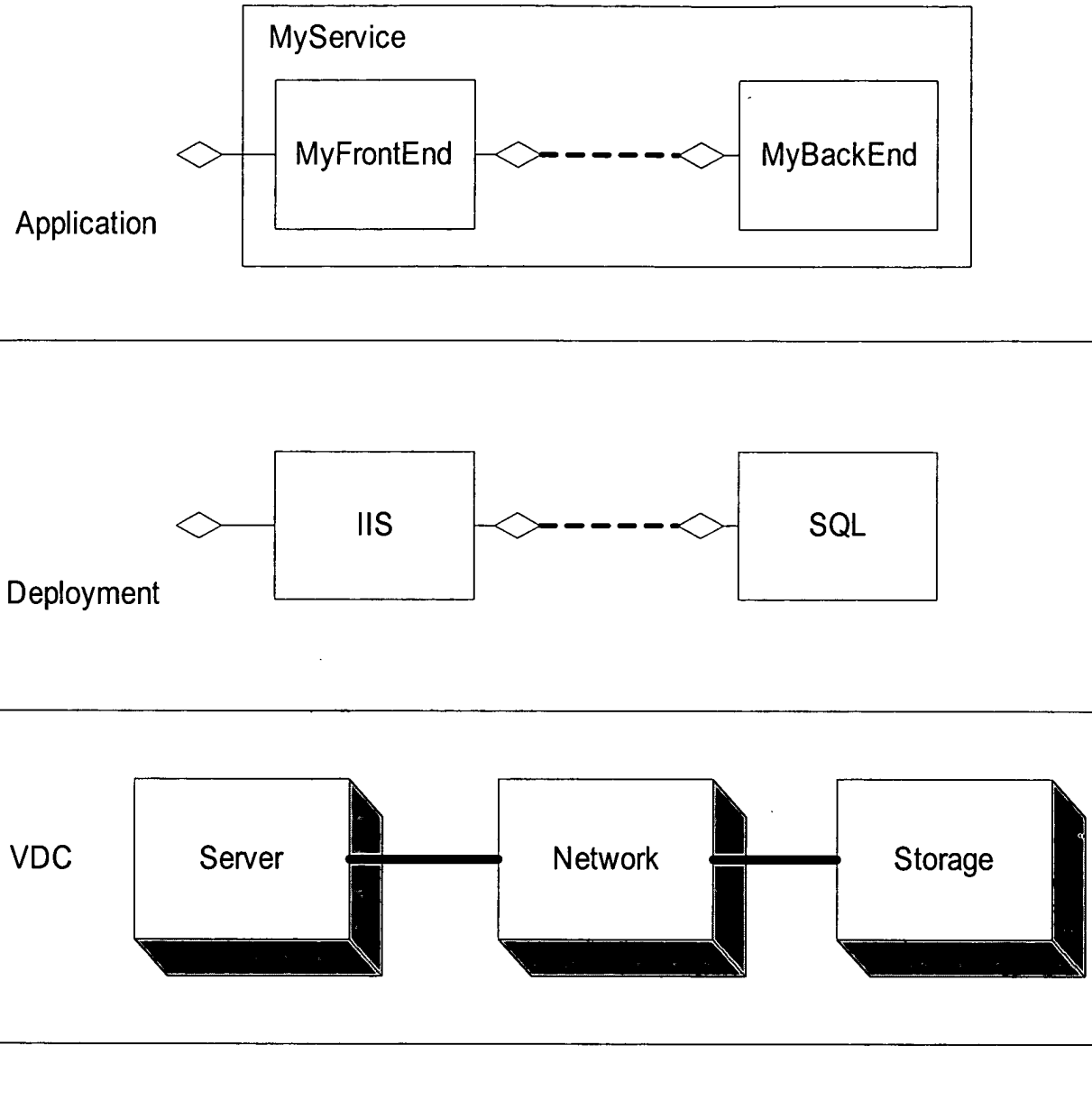

MyService
MyFrontEnd
MyBackEnd
Application
IIS
SQL
Deployment
VDC
Server
Network
Storage
Hardware

Fig. 11

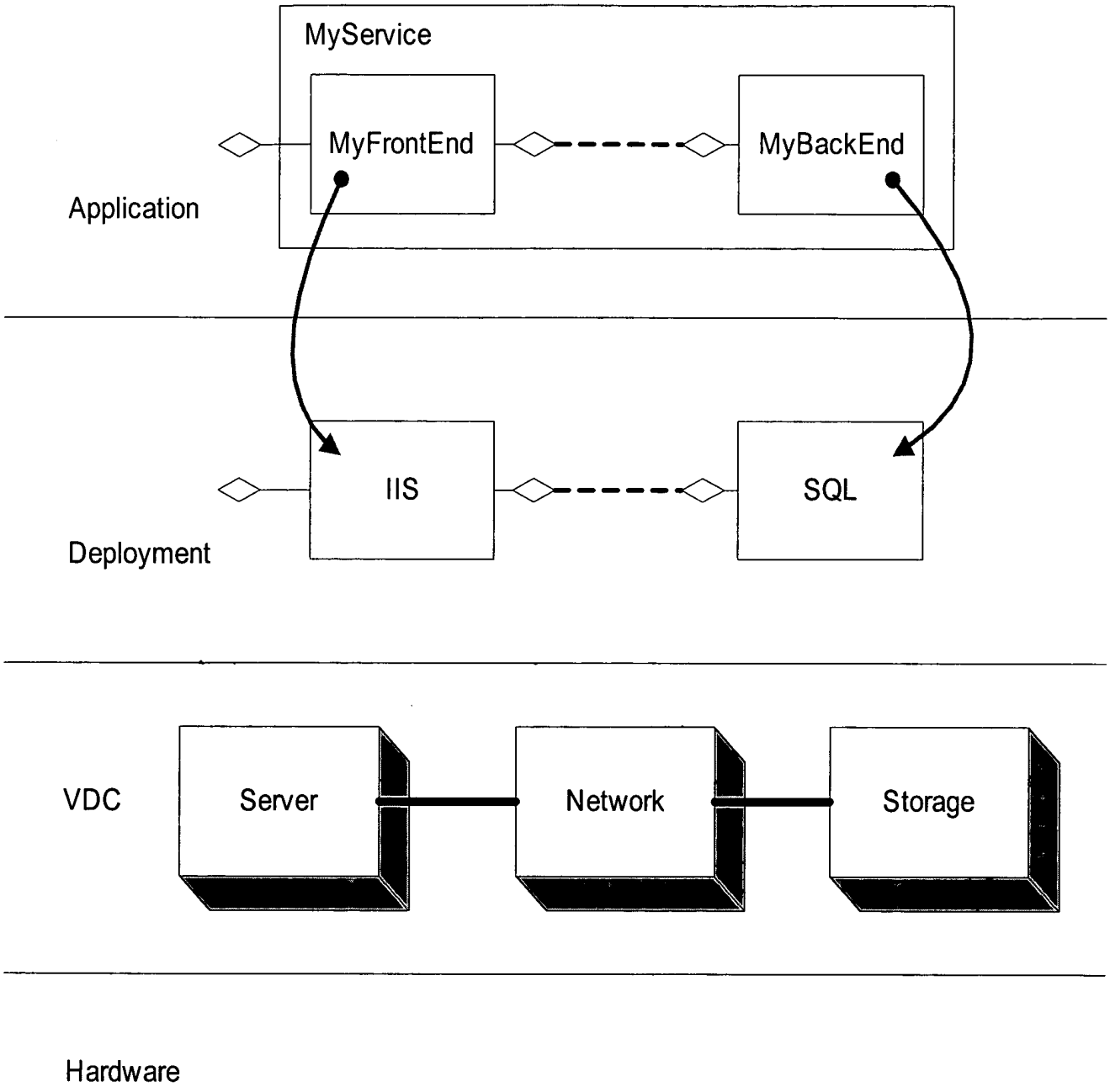

MyService
MyFrontEnd
MyBackEnd
Application
IIS
SQL
Deployment
VDC
Server
Network
Storage
Hardware

Fig. 12

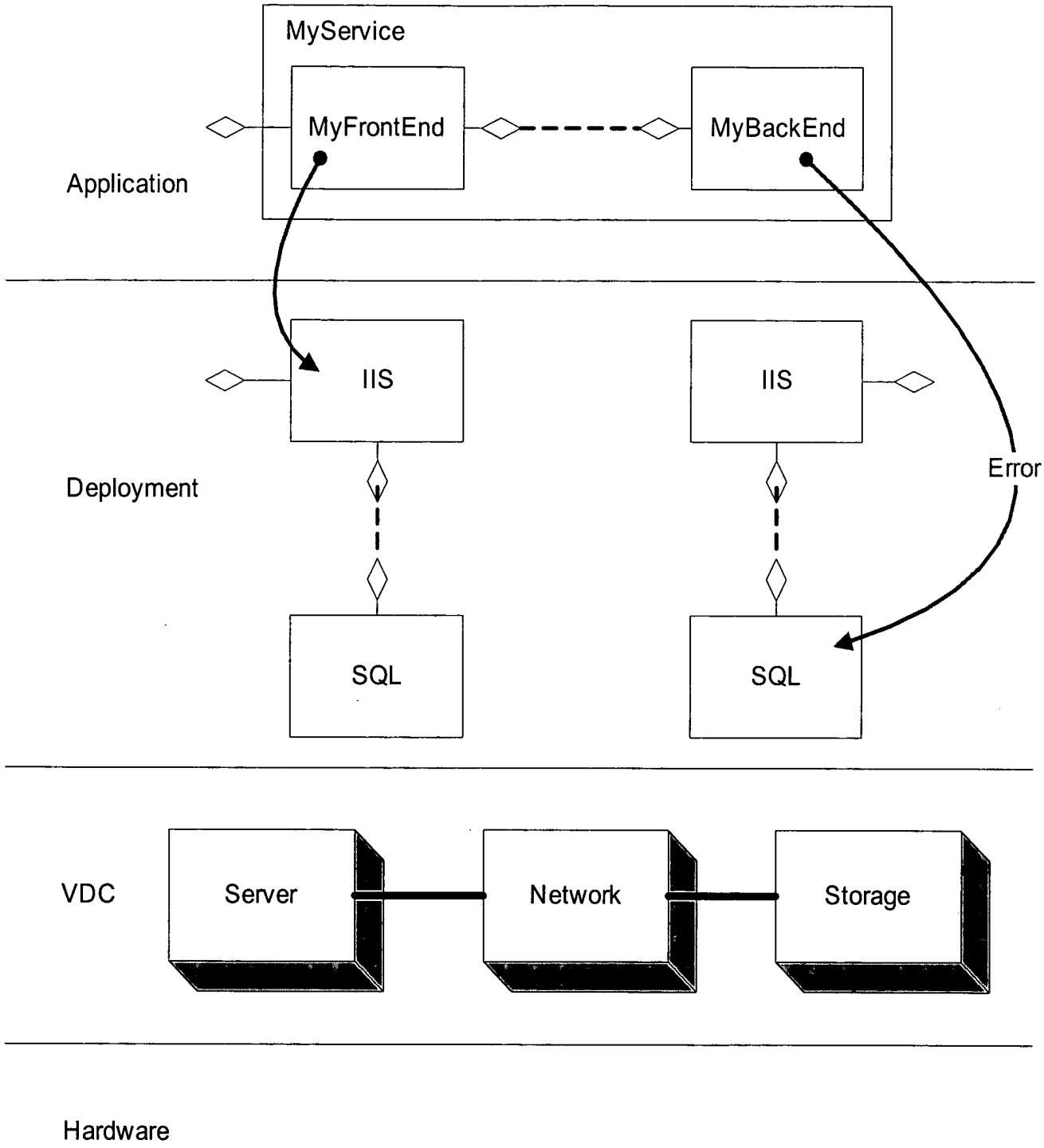

MyService
MyFrontEnd
MyBackEnd
Application
IIS
IIS
Deployment
Error
SQL
SQL
VDC
Server
Network
Storage
Hardware

Fig. 13

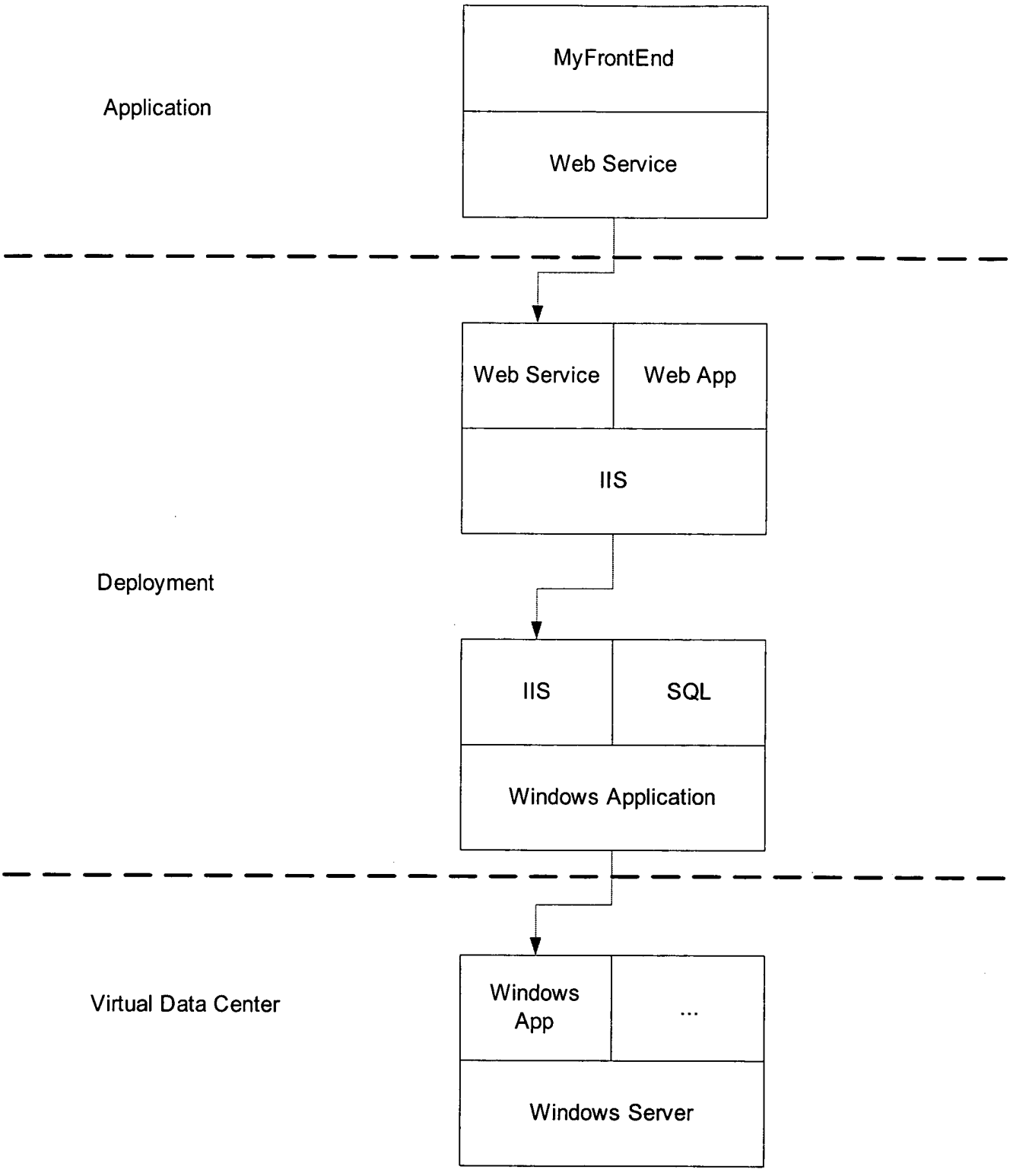

Application
MyFrontEnd
Web Service
Web Service
Web App
IIS
Deployment
IIS
SQL
Windows Application
Virtual Data Center
Windows App
...
Windows Server

Fig. 14

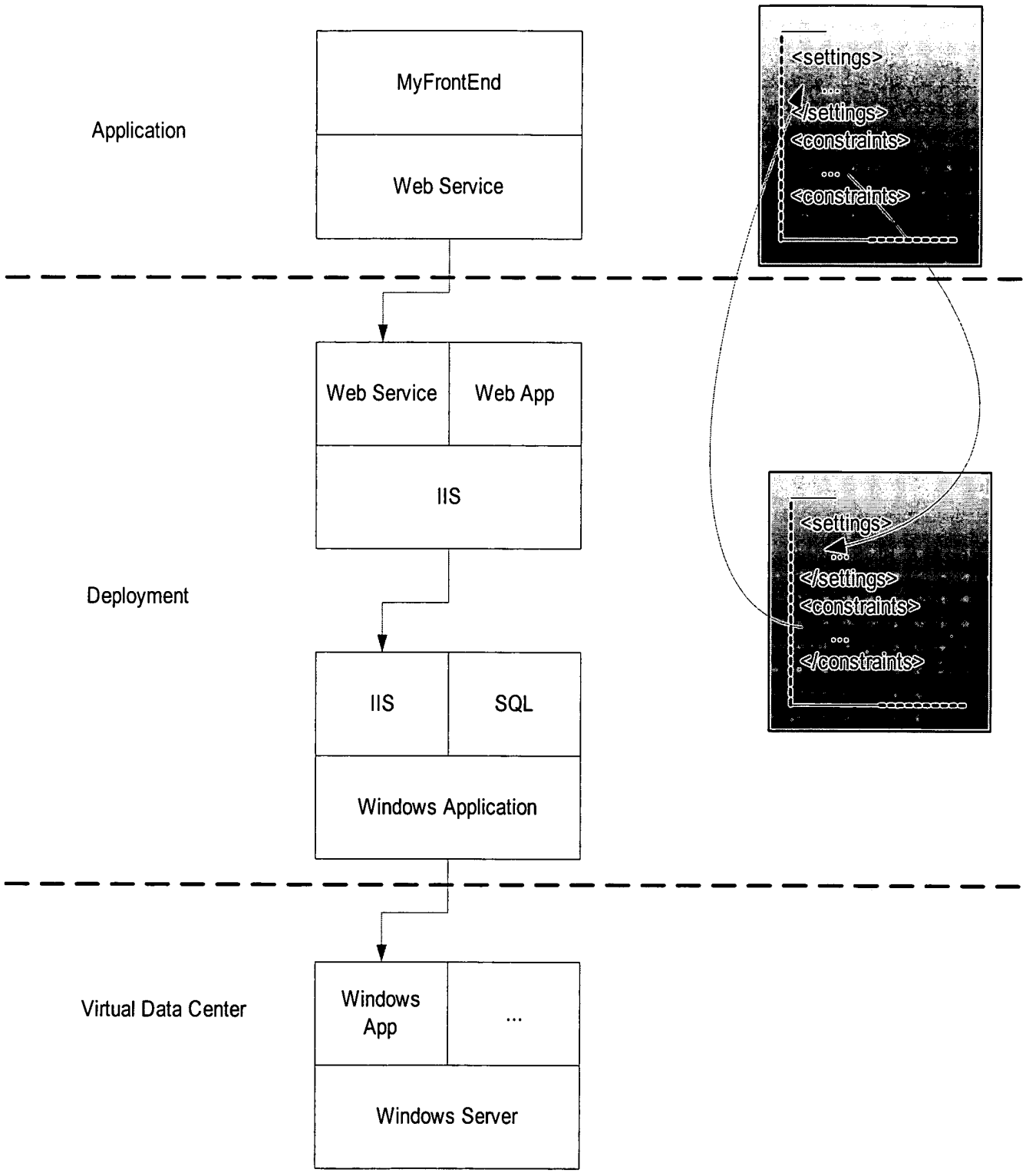

Application
MyFrontEnd
Web Service
<settings>
...
</settings>
<constraints>
...
<constraints>
Deployment
Web Service
Web App
IIS
<settings>
...
</settings>
<constraints>
...
</constraints>
IIS
SQL
Windows Application
Virtual Data Center
Windows App
...
Windows Server

Fig. 15

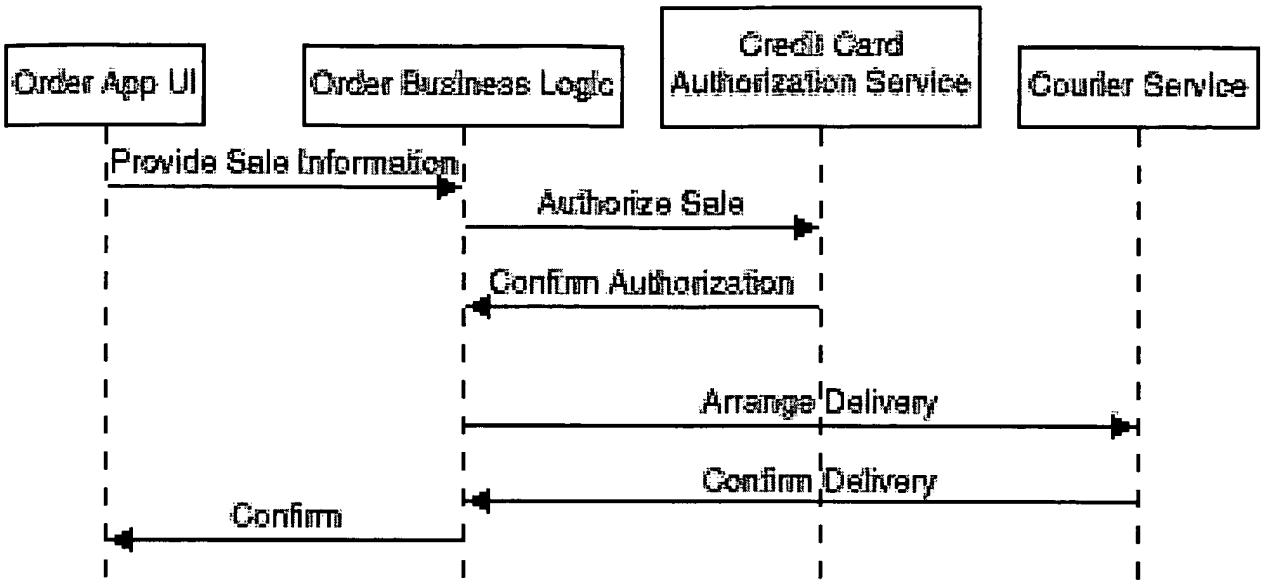

Order App UI
Order Business Logic
Credit Card Authorization Service
Courier Service
Provide Sale Information
Authorize Sale
Confirm Authorization
Arrange Delivery
Confirm Delivery
Confirm

Fig. 16

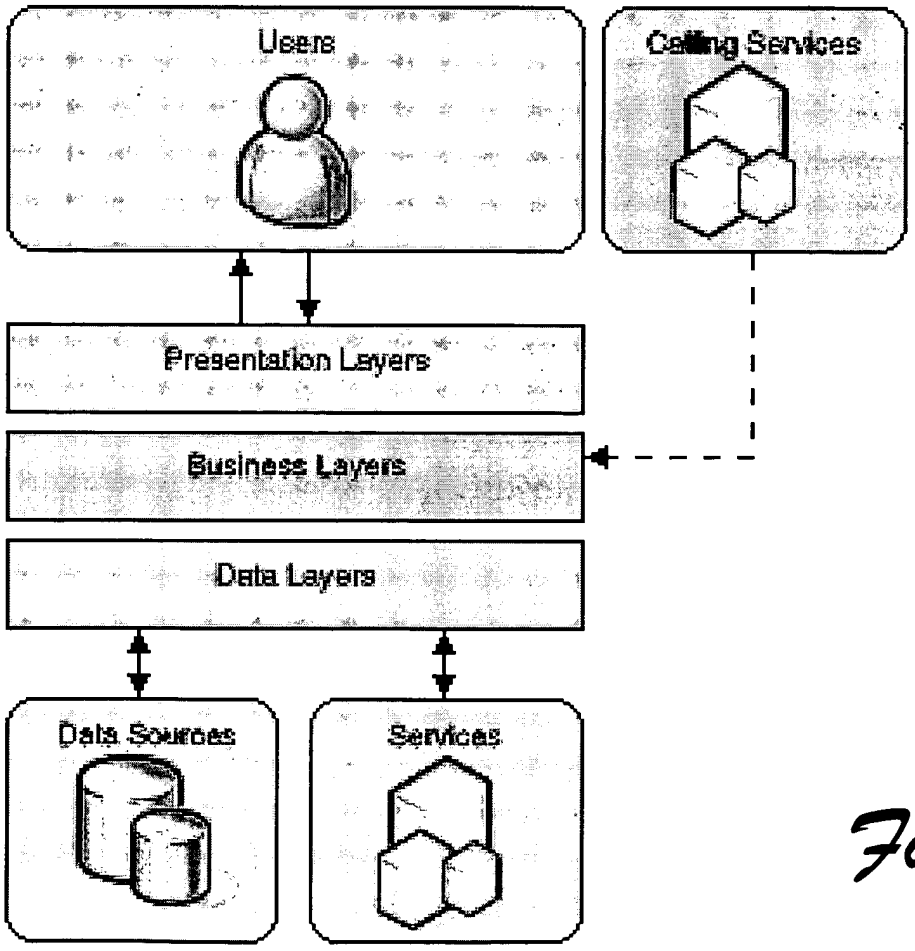

Users
Calling Services
Presentation Layers
Business Layers
Data Layers
Data Sources
Services

Fig. 18

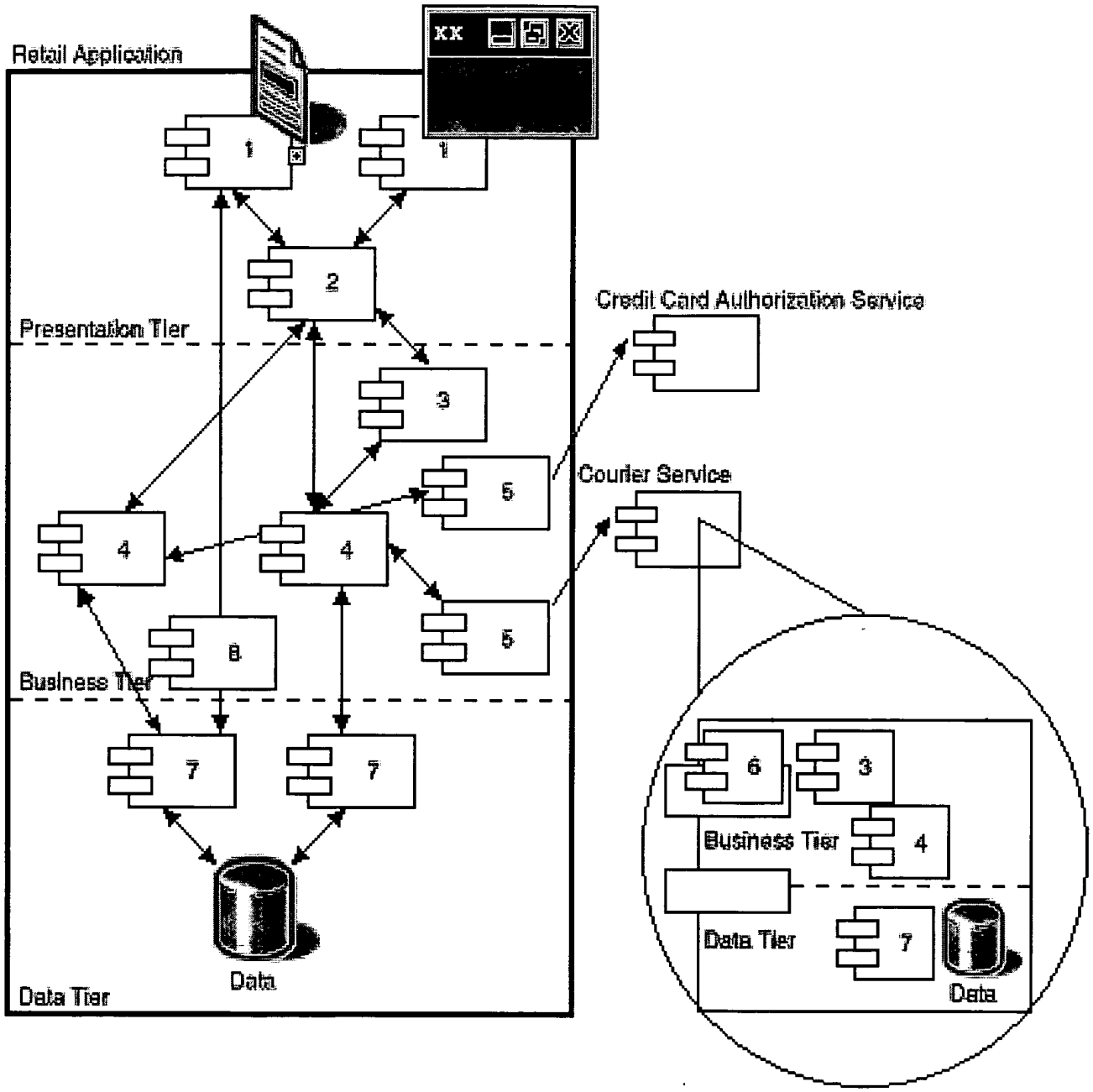

Retail Application
Presentation Tier
Business Tier
Data Tier
Data
Credit Card Authorization Service
Courier Service
Business Tier
Data Tier
Data

Fig. 17

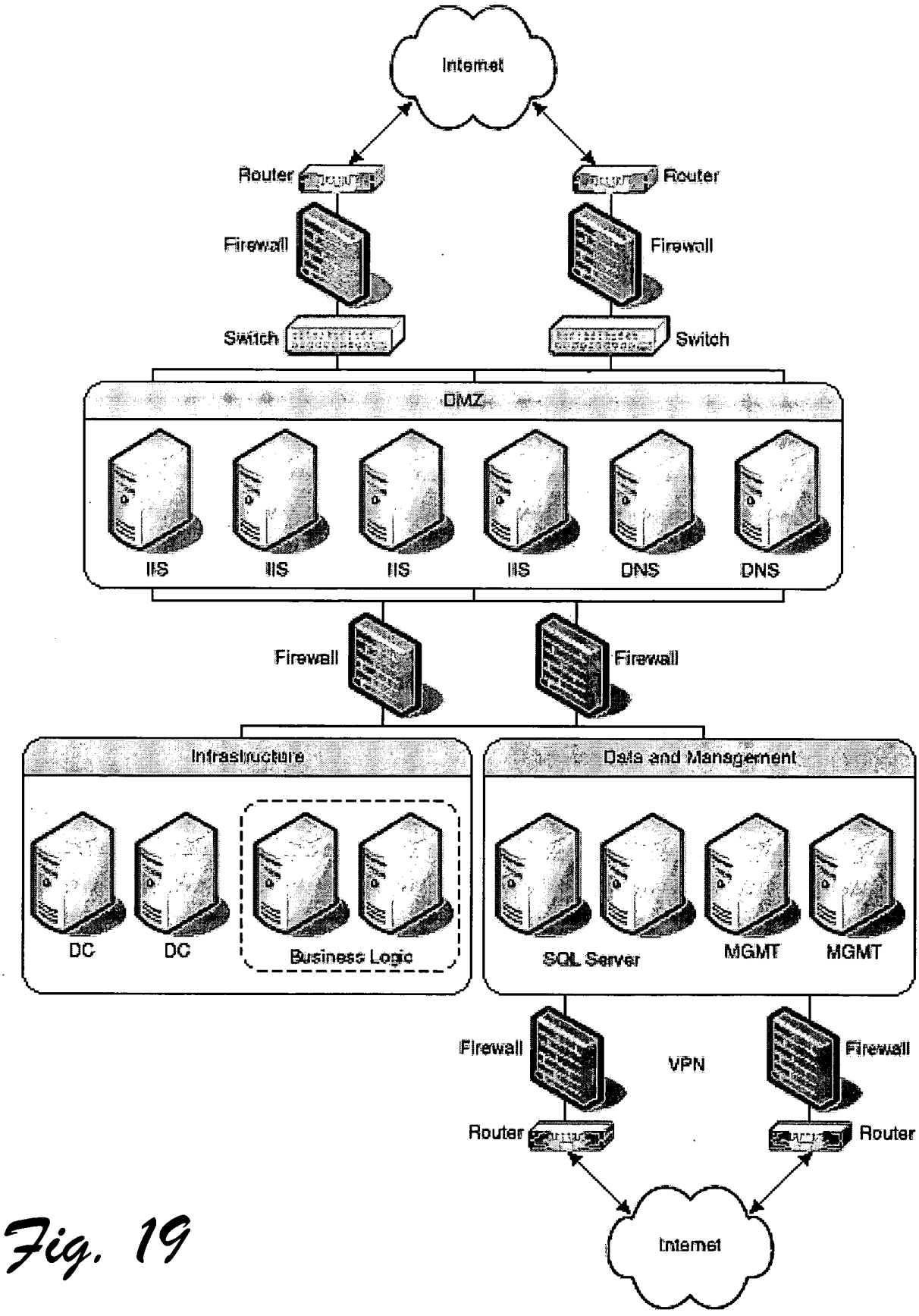

Internet
Router
Router
Firewall
Firewall
Switch
Switch
DMZ
IIS
IIS
IIS
IIS
DNS
DNS
Firewall
Firewall
Infrastructure
Data and Management
DC
DC
Business Logic
SQL Server
MGMT
MGMT
Firewall
VPN
Firewall
Router
Router
Internet

Fig. 19

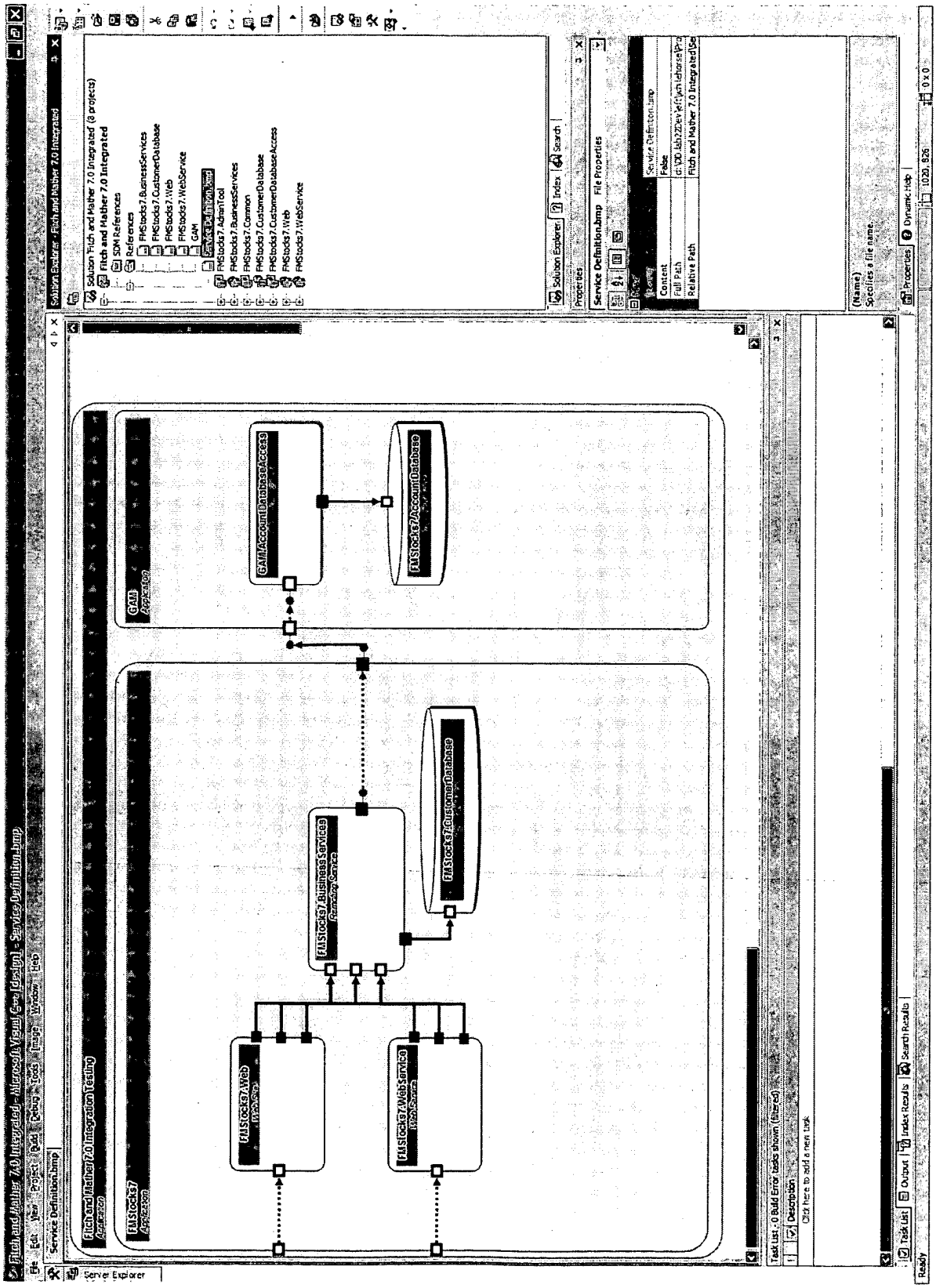

Fitch and Mather 7.0 Integrated - Microsoft Visual C# [design] - Service Definition.bmp
Solution Explorer - Fitch and Mather 7.0 Integrated
Solution Fitch and Mather 7.0 Integrated (8 projects)
Fitch and Mather 7.0 Integrated
Service Definition.bmp
Service Definition.bmp File Properties
Content
Full Path
Relative Path
Fitch and Mather 7.0 Integrated
Fitch and Mather 7.0 Integration Testing
Application
FMStock67
Application
GAM
Application
GAM.AccountDatabaseAccess
FMStock67.AccountDatabase
FMStock67.Web
FMStock67.BusinessServices
FMStock67.CustomerDatabase
FMStock67.WebService
Server Explorer
Task List - 0 Build Error, 0 items shown (filtered)
Description
Click here to add a new task
Task List
Output
Find Results
Search Results
Properties
Dynamic Help
Ready

Fig. 20

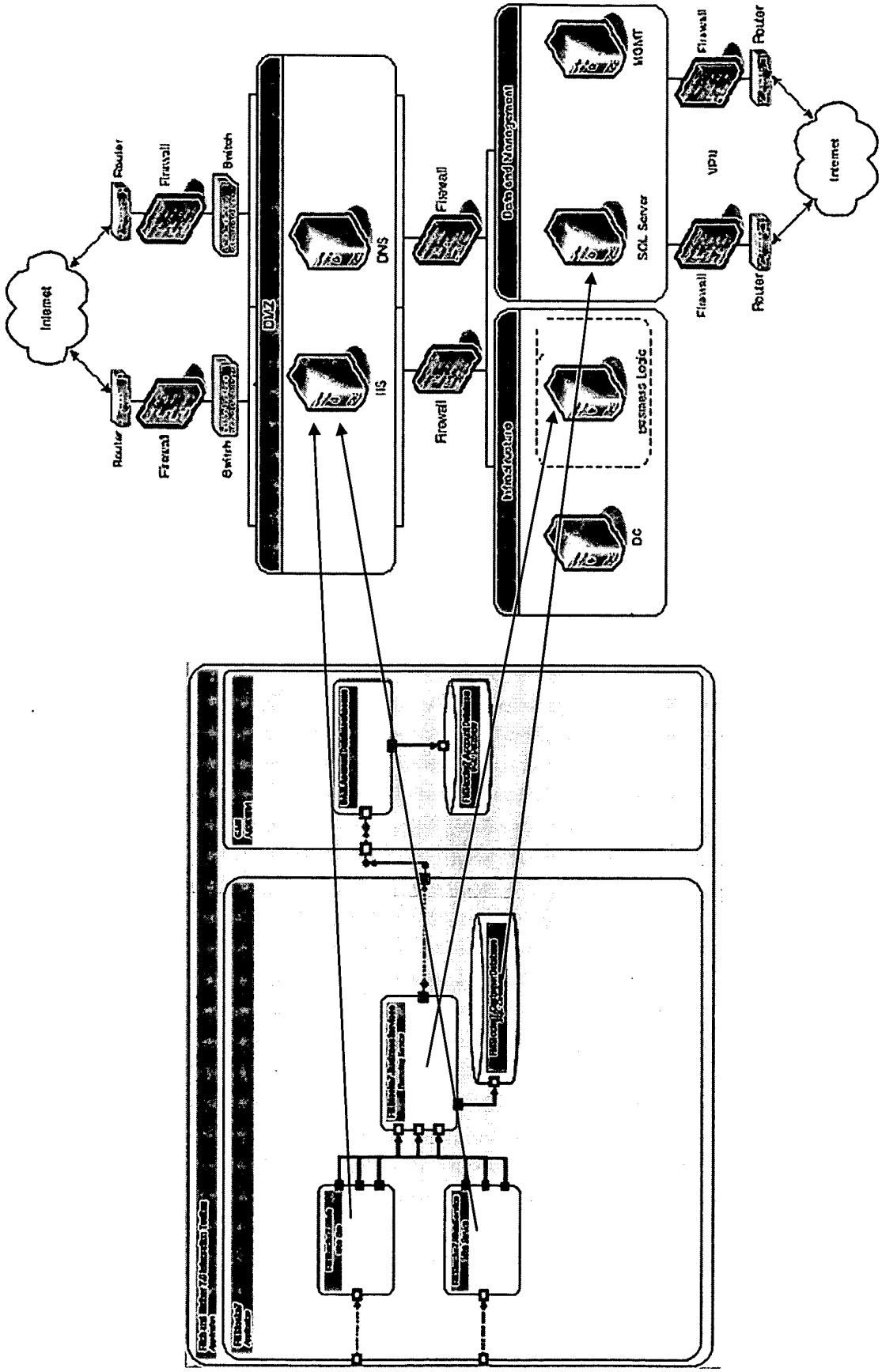

Internet
Router
Firewall
Switch
DMZ
DNS
IIS
Firewall
Infrastructure
Business Logic
DC
Data and Management
MOM
SQL Server
VPN
Firewall
Router
Internet

Fig. 21

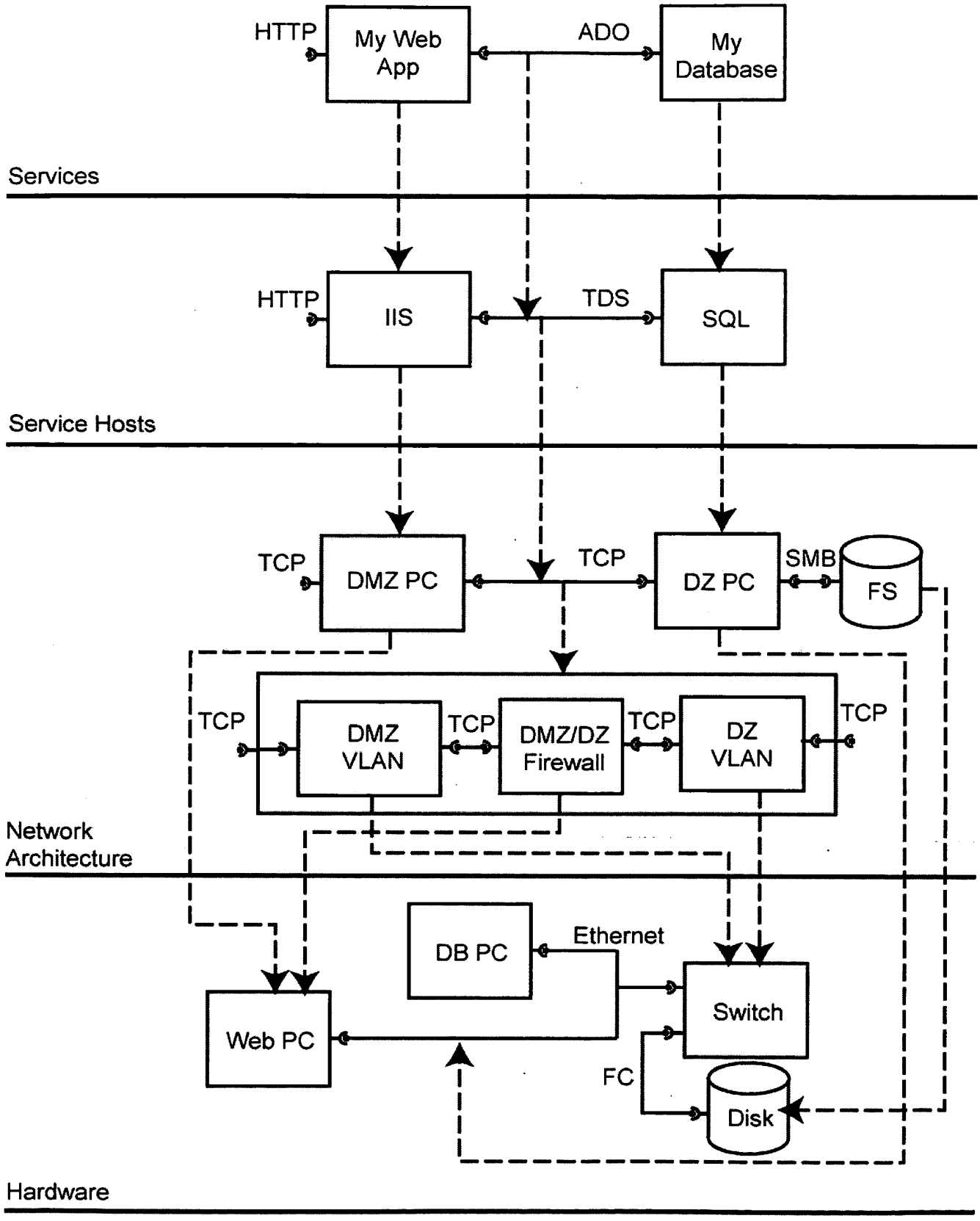

HTTP
My Web App
ADO
My Database
Services
HTTP
IIS
TDS
SQL
Service Hosts
TCP
DMZ PC
TCP
DZ PC
SMB
FS
TCP
DMZ VLAN
TCP
DMZ/DZ Firewall
TCP
DZ VLAN
TCP
Network Architecture
DB PC
Ethernet
Switch
Web PC
FC
Disk
Hardware

Fig. 22

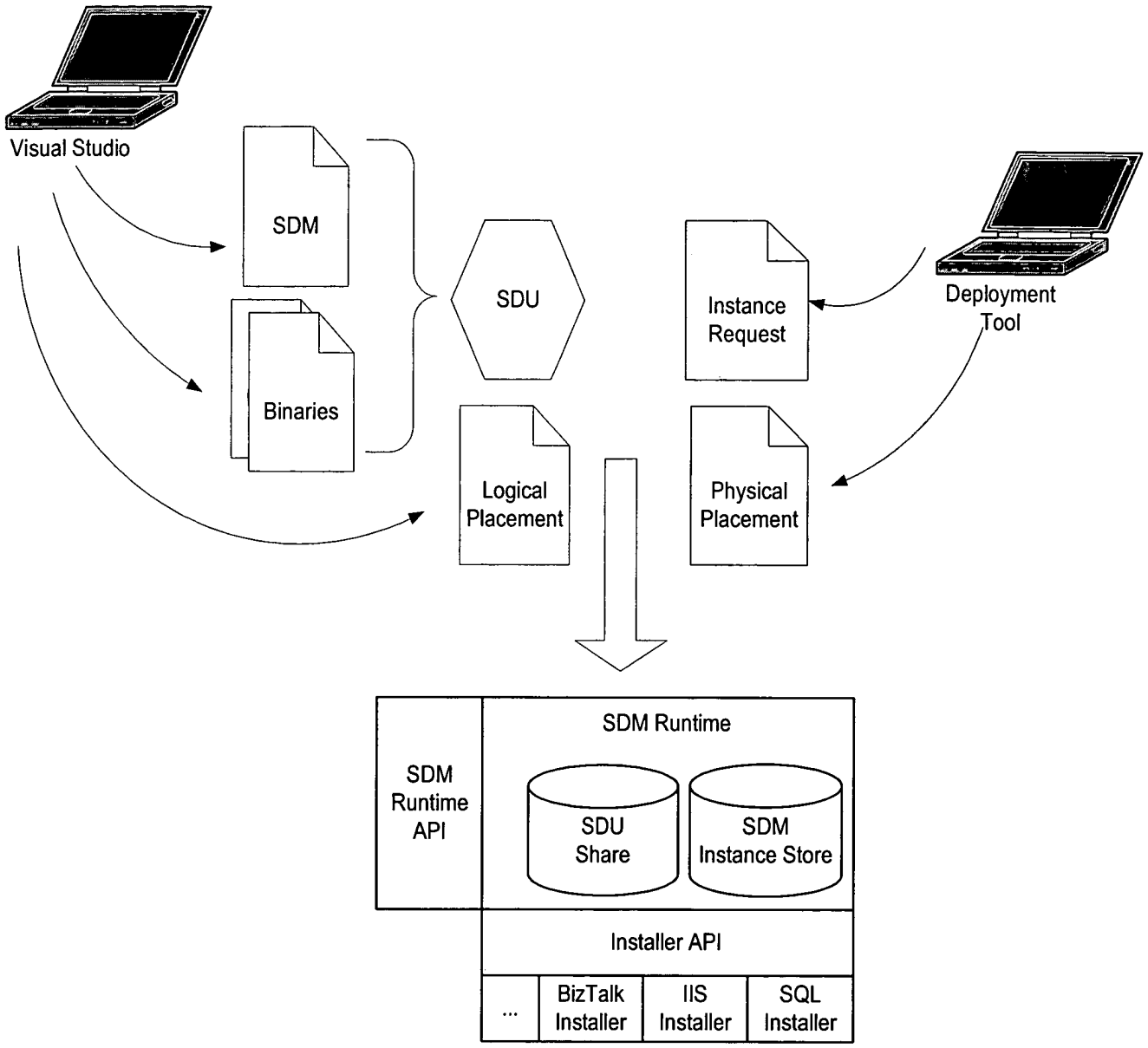

Visual Studio
SDM
Binaries
SDU
Instance Request
Deployment Tool
Logical Placement
Physical Placement
SDM Runtime API
SDM Runtime
SDU Share
SDM Instance Store
Installer API
...
BizTalk Installer
IIS Installer
SQL Installer

Fig. 23

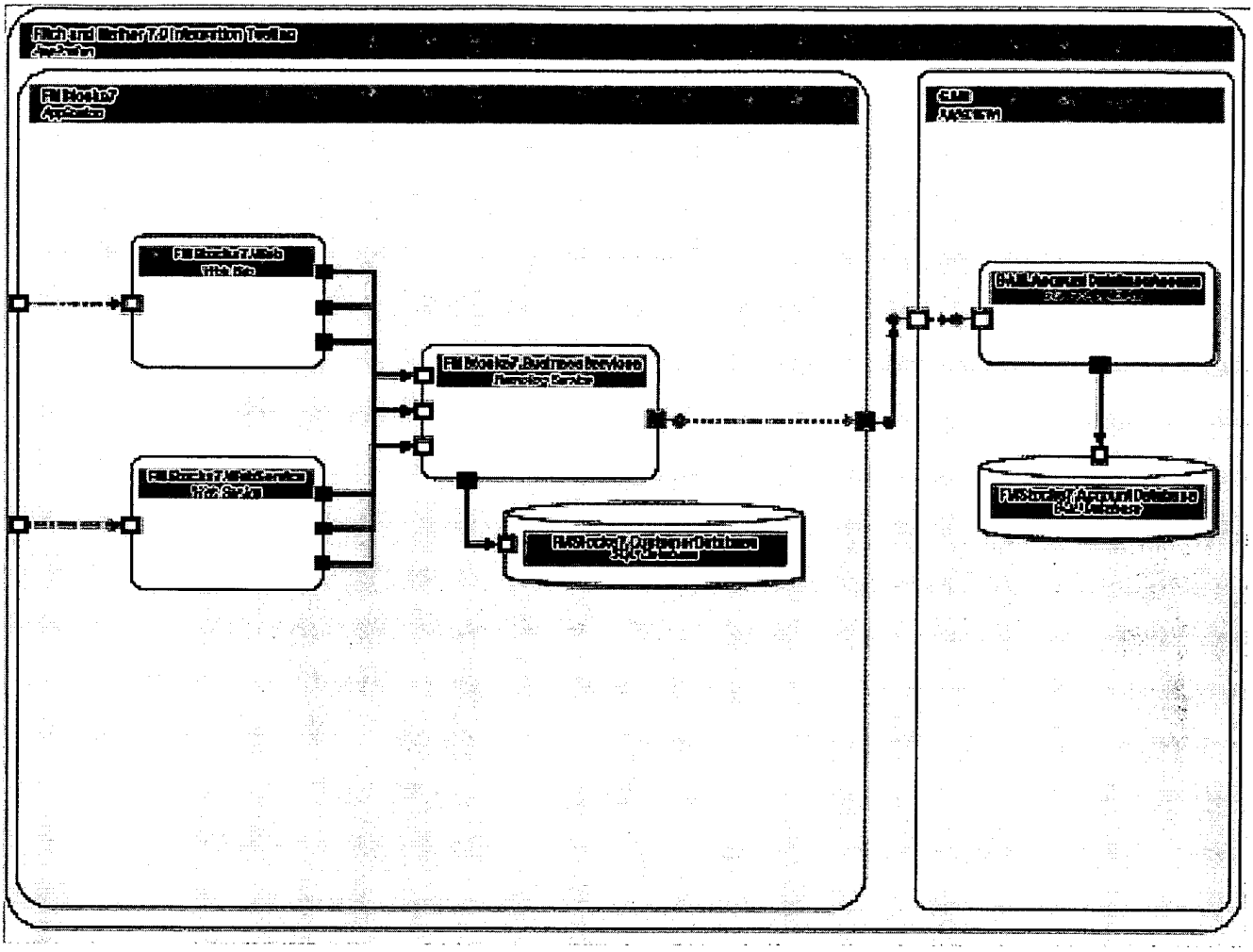


Fig. 24

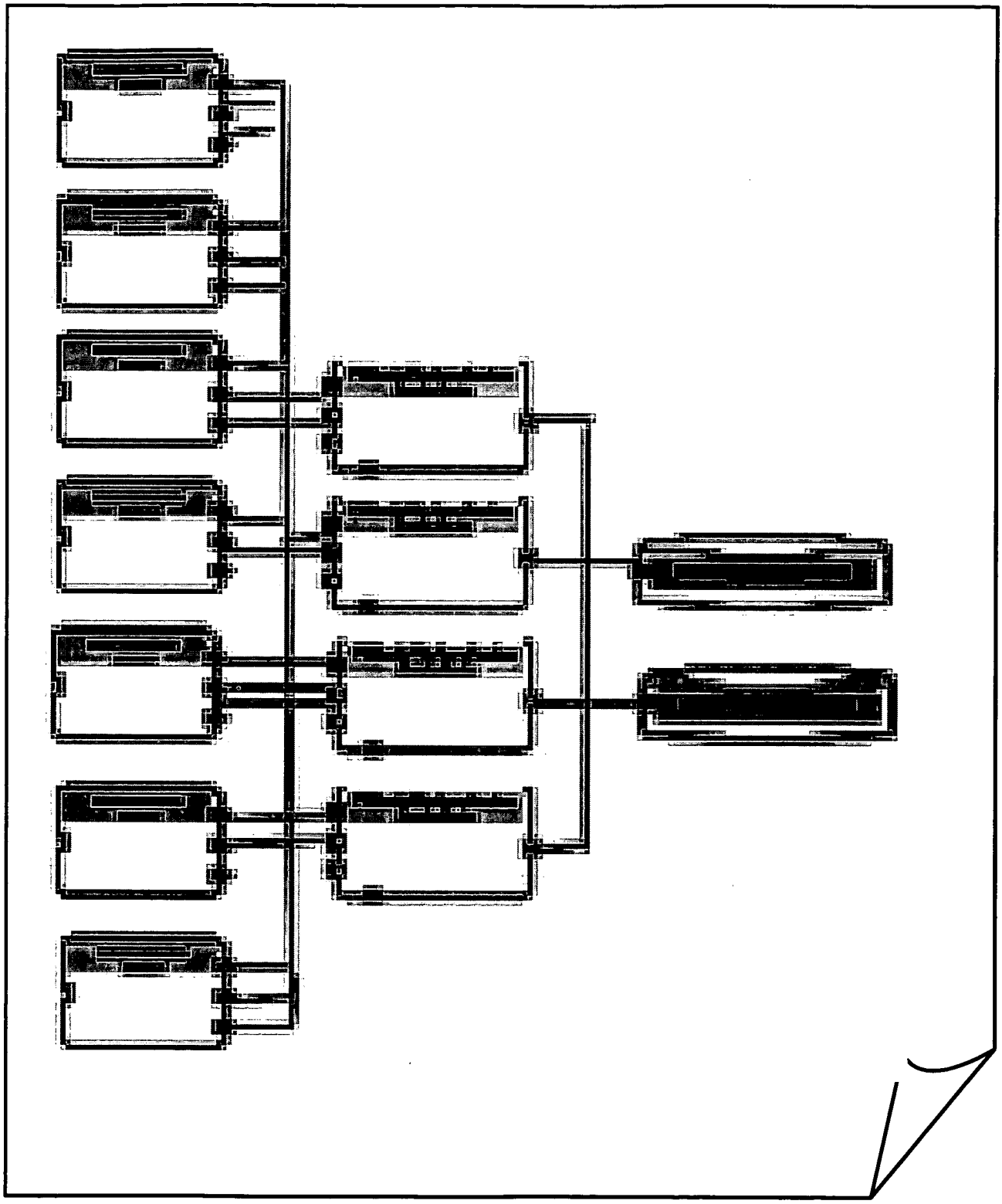


Fig. 25

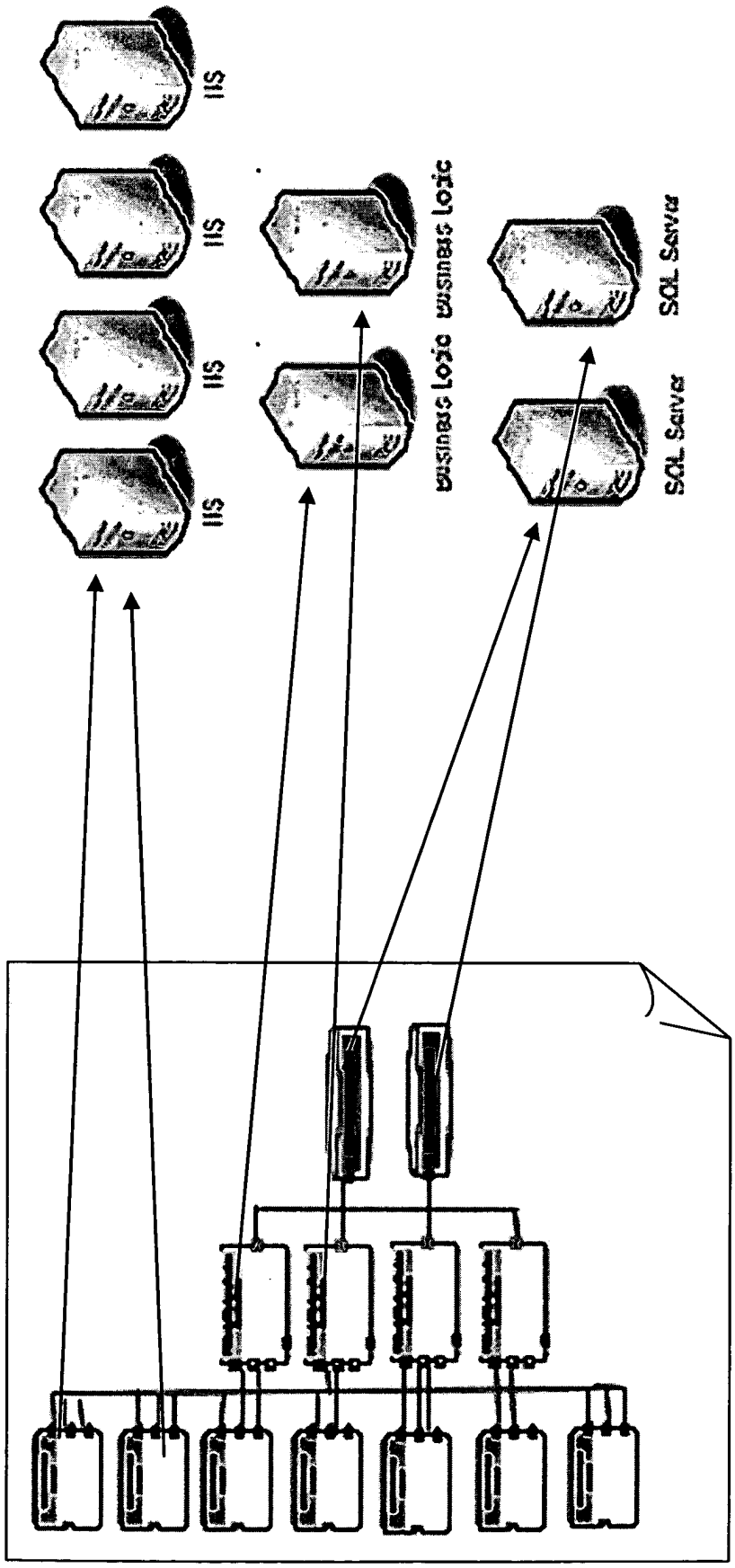

IIS
IIS
IIS
IIS
business logic
business logic
SQL Server
SQL Server

Fig. 26

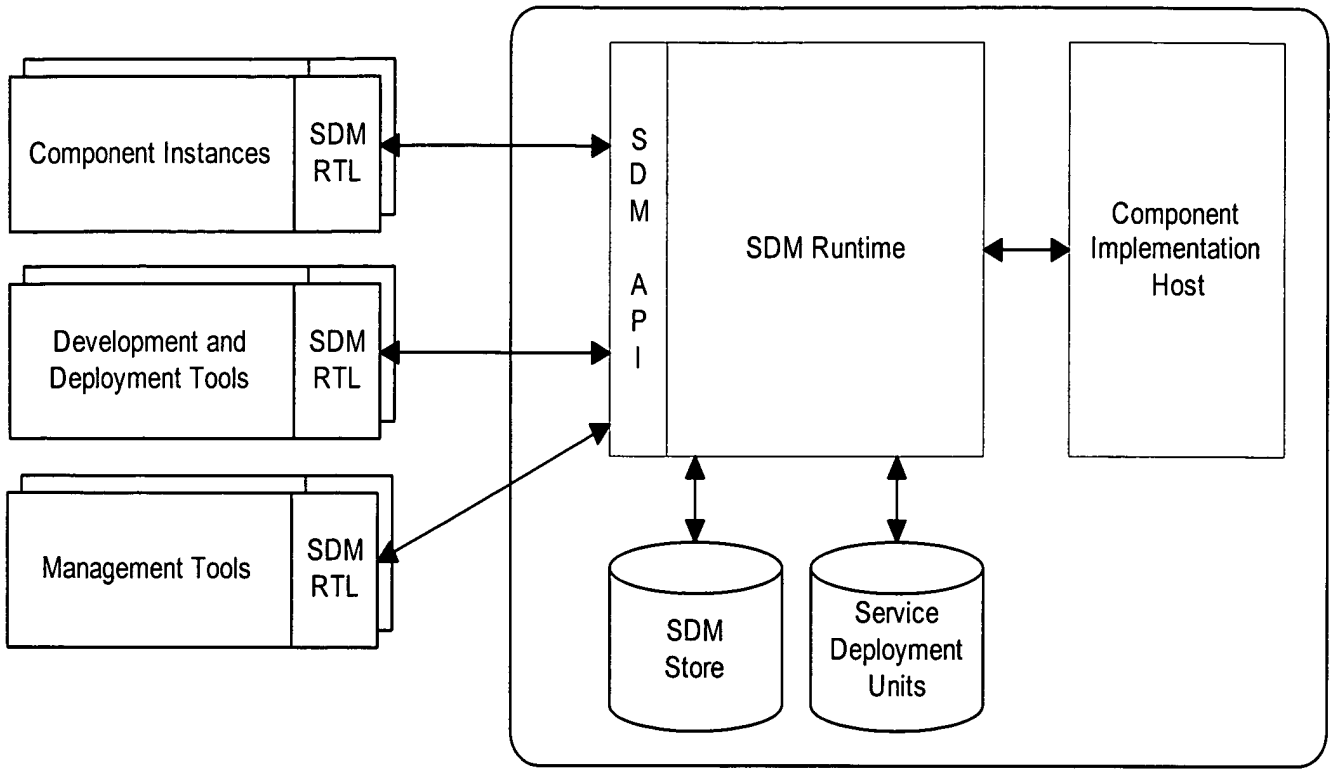

Component Instances
SDM RTL
Development and Deployment Tools
SDM RTL
Management Tools
SDM RTL
S D M A P I
SDM Runtime
Component Implementation Host
SDM Store
Service Deployment Units

Fig. 27

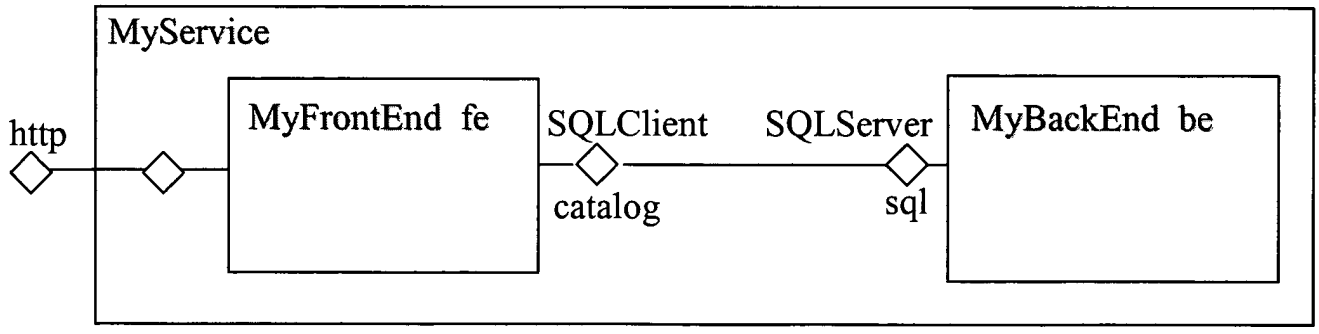

MyService
http
MyFrontEnd fe
SQLClient
catalog
SQLServer
sql
MyBackEnd be

Fig. 28

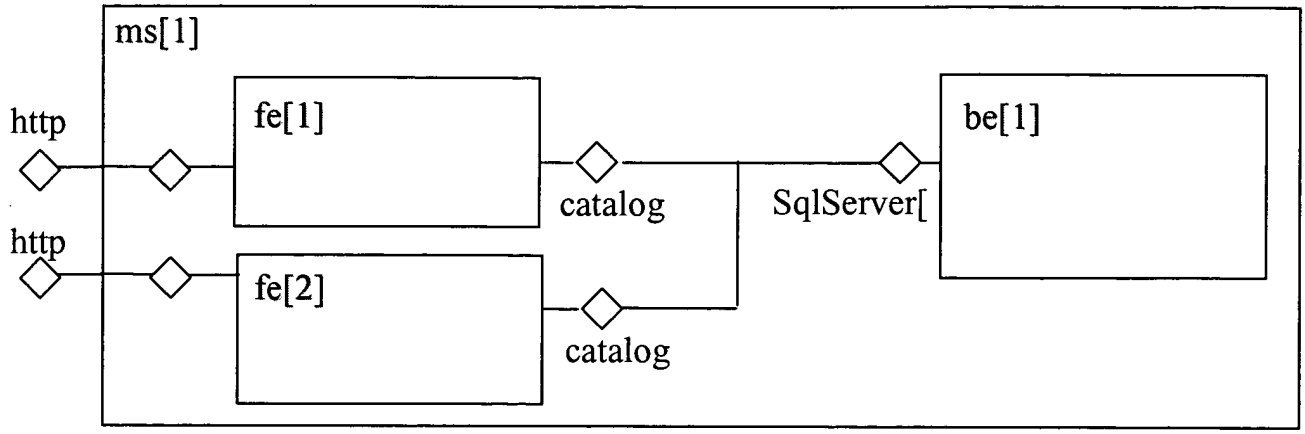

ms[1]
http
http
fe[1]
fe[2]
catalog
catalog
SqlServer[
be[1]

Fig. 29

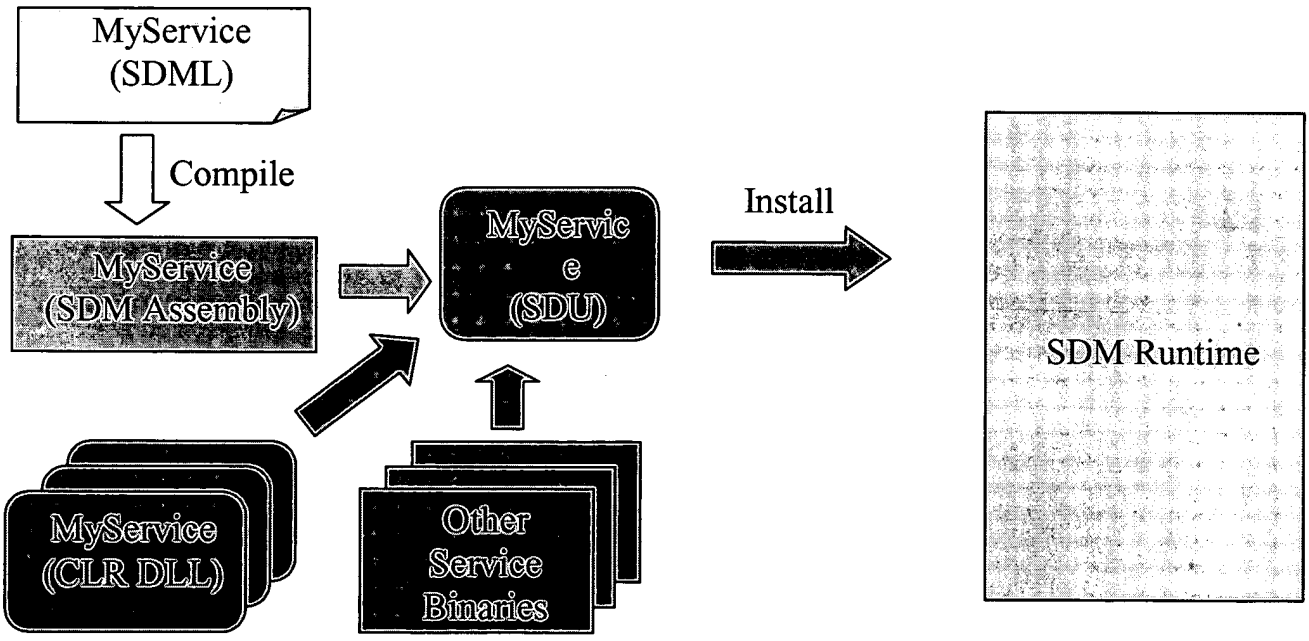

MyService
(SDML)
Compile
MyService
(SDM Assembly)
MyServic
e
(SDU)
Install
SDM Runtime
MyService
(CLR DLL)
Other
Service
Binaries

Fig. 30

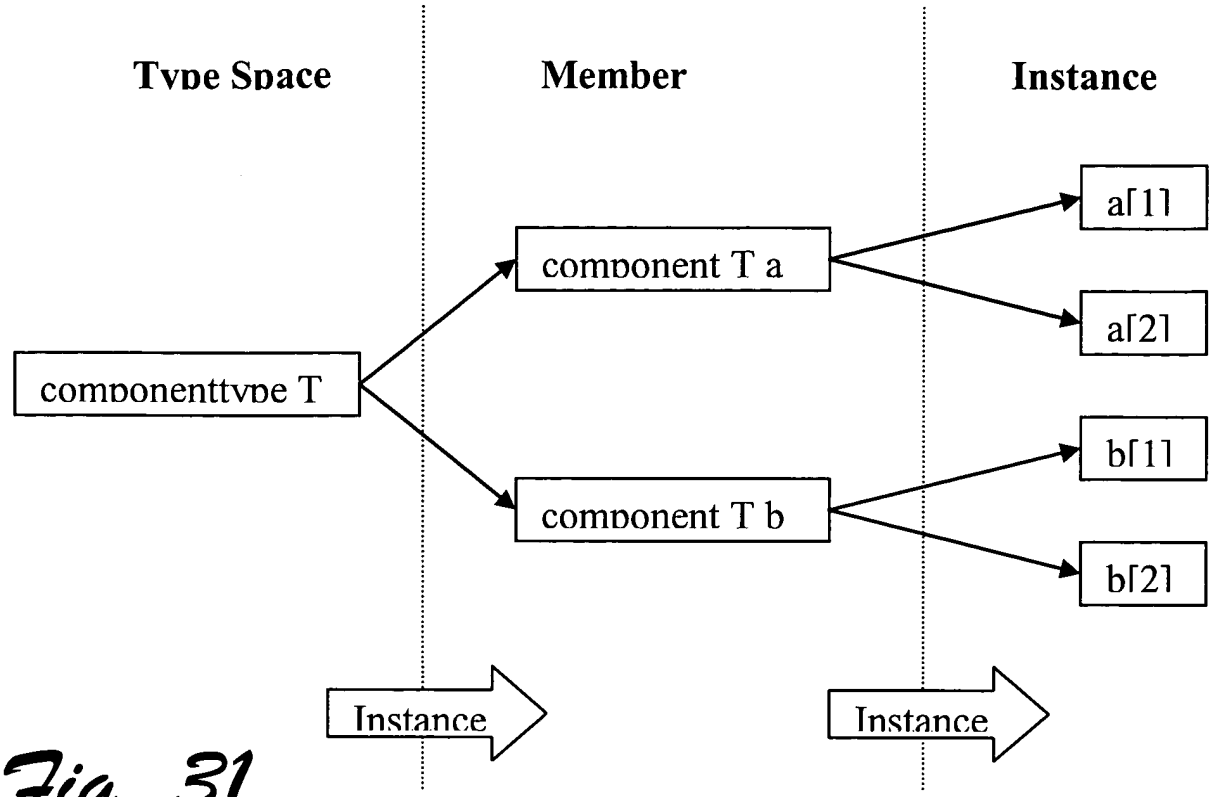

Type Space
Member
Instance
componenttype T
component T a
component T b
a[1]
a[2]
b[1]
b[2]
Instance
Instance

Fig. 31

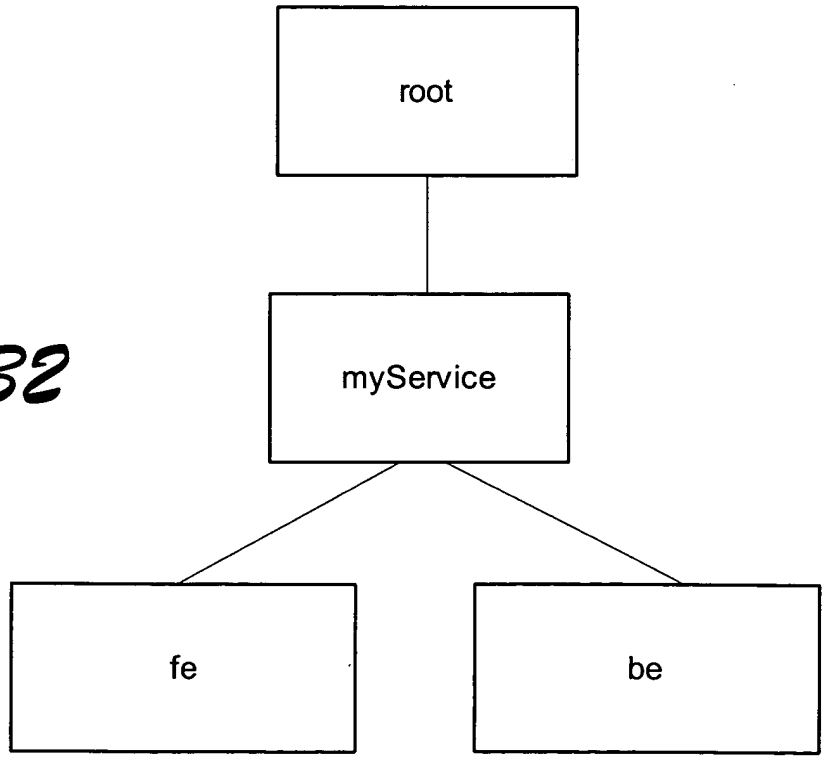
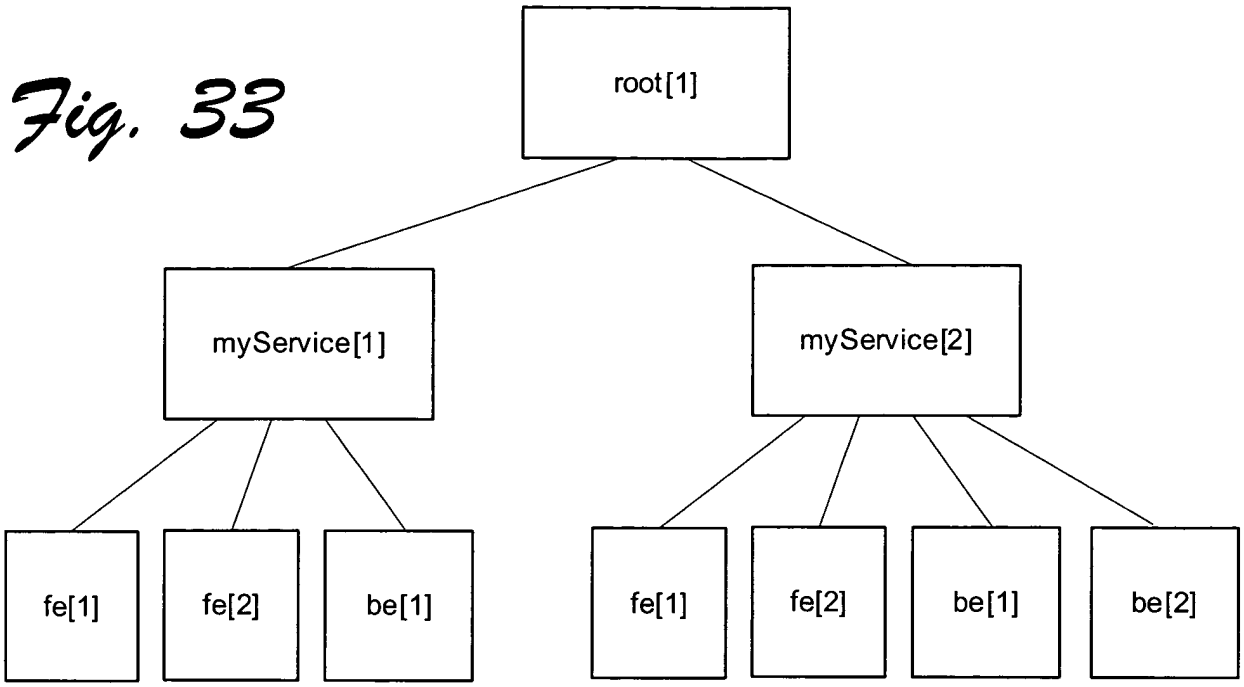

root
myService
fe
be

Fig. 32

Fig. 33


root[1]
myService[1]
myService[2]
fe[1]
fe[2]
be[1]
fe[1]
fe[2]
be[1]
be[2]

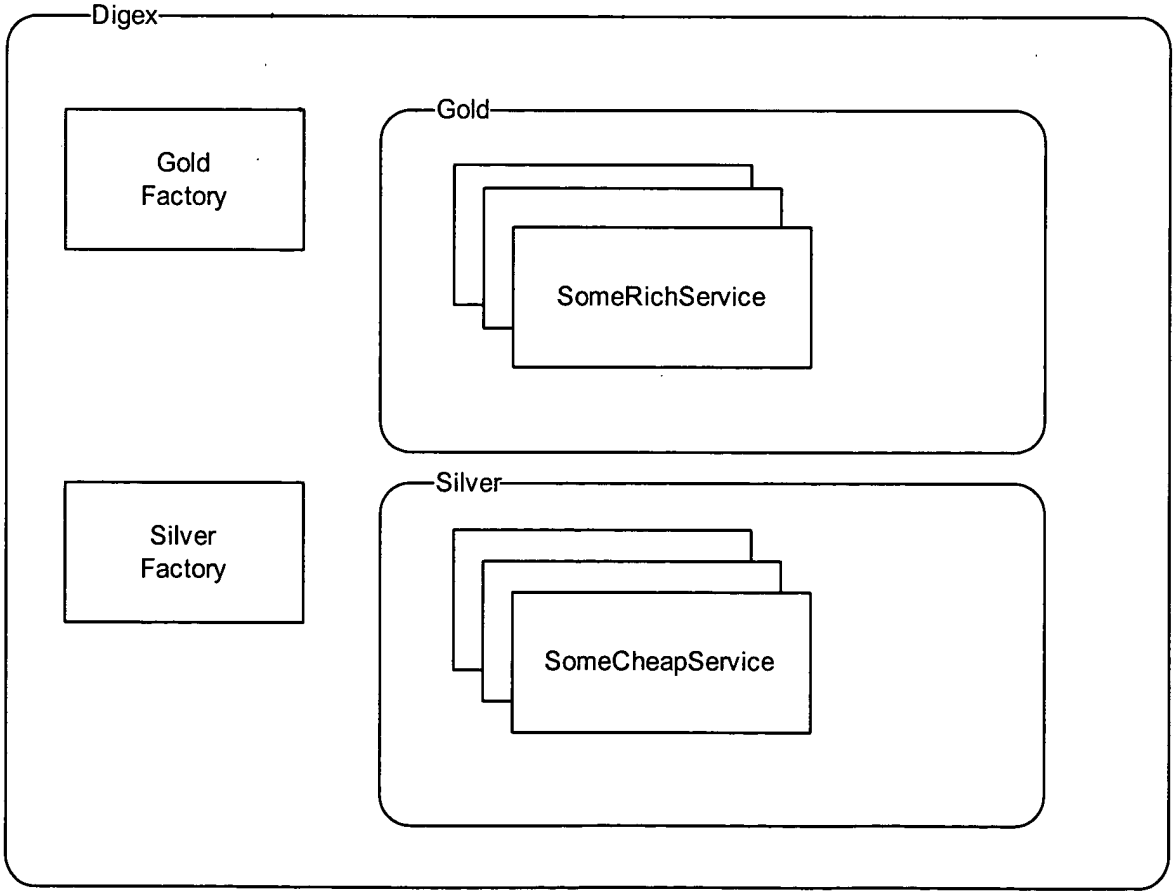

Digex
Gold Factory
Gold
SomeRichService
Silver Factory
Silver
SomeCheapService

Fig. 34

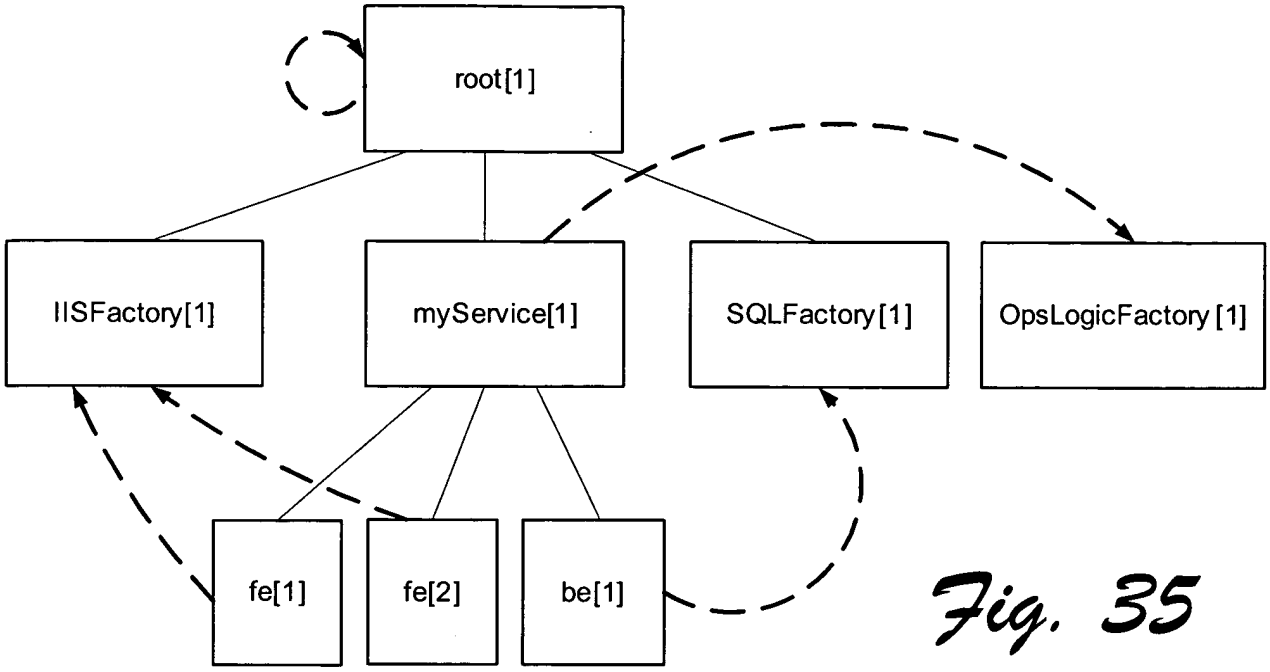

root[1]
IISFactory[1]
myService[1]
SQLFactory[1]
OpsLogicFactory [1]
fe[1]
fe[2]
be[1]

Fig. 35

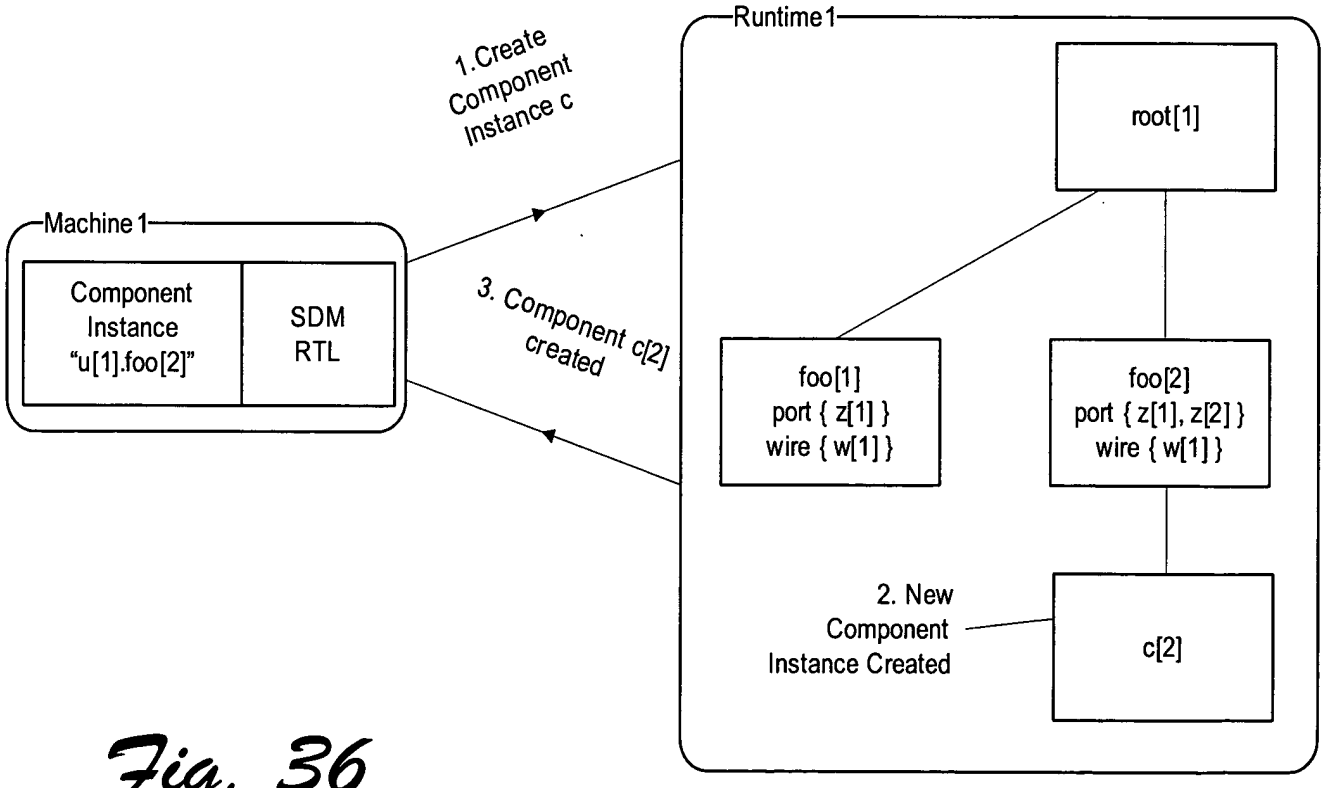

Runtime 1
1.Create Component Instance c
Machine 1
Component Instance "u[1].foo[2]"
SDM RTL
3. Component c[2] created
root[1]
foo[1]
port { z[1] }
wire { w[1] }
foo[2]
port { z[1], z[2] }
wire { w[1] }
2. New Component Instance Created
c[2]

Fig. 36

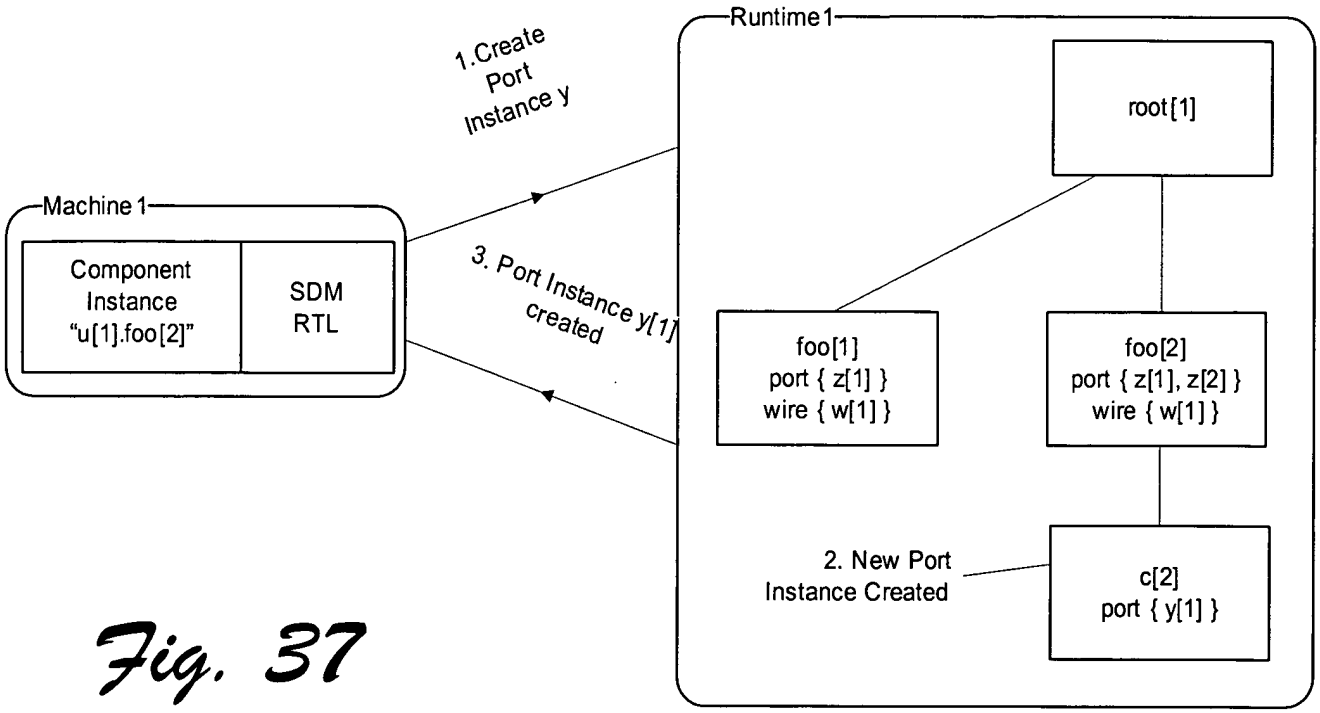

Runtime 1
root[1]
1. Create Port Instance y
Machine 1
Component Instance "u[1].foo[2]"
SDM RTL
3. Port Instance y[1] created
foo[1]
port { z[1] }
wire { w[1] }
foo[2]
port { z[1], z[2] }
wire { w[1] }
2. New Port Instance Created
c[2]
port { y[1] }

Fig. 37

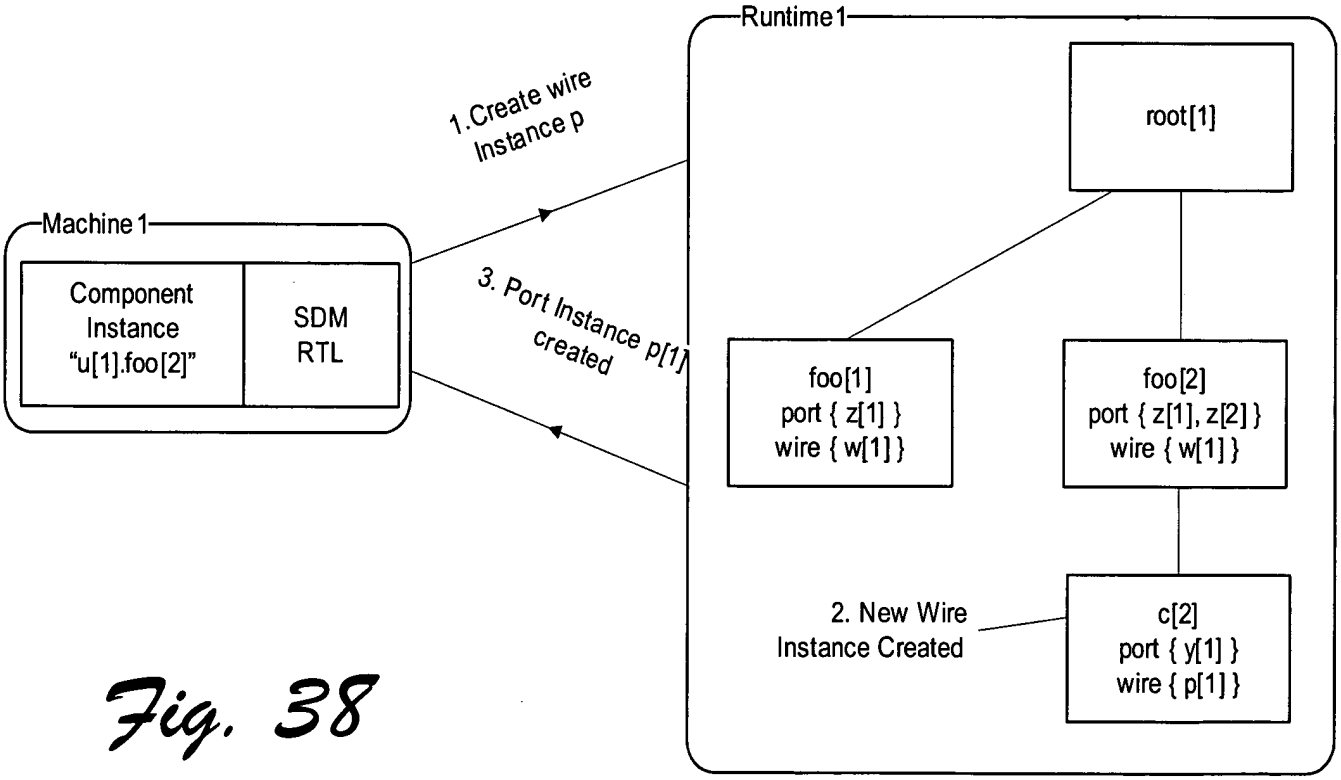

Runtime 1
root[1]
1. Create wire Instance p
Machine 1
Component Instance "u[1].foo[2]"
SDM RTL
3. Port Instance p[1] created
foo[1]
port { z[1] }
wire { w[1] }
foo[2]
port { z[1], z[2] }
wire { w[1] }
2. New Wire Instance Created
c[2]
port { y[1] }
wire { p[1] }

Fig. 38

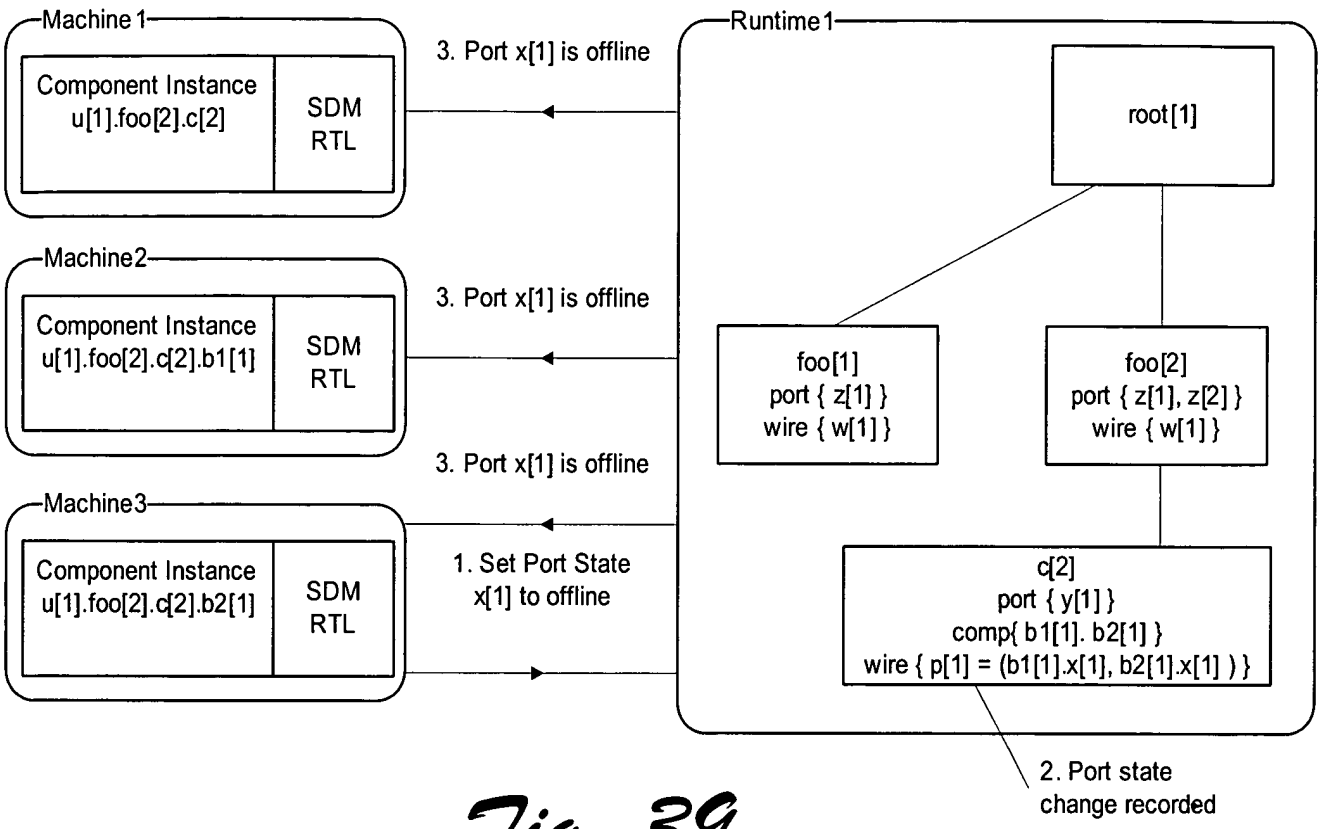

Machine 1
Component Instance u[1].foo[2].c[2]
SDM RTL
3. Port x[1] is offline
Machine2
Component Instance u[1].foo[2].c[2].b1[1]
SDM RTL
3. Port x[1] is offline
Machine3
Component Instance u[1].foo[2].c[2].b2[1]
SDM RTL
3. Port x[1] is offline
1. Set Port State x[1] to offline
Runtime1
root[1]
foo[1]
port { z[1] }
wire { w[1] }
foo[2]
port { z[1], z[2] }
wire { w[1] }
c[2]
port { y[1] }
comp{ b1[1]. b2[1] }
wire { p[1] = (b1[1].x[1], b2[1].x[1]) }
2. Port state change recorded

Fig. 39

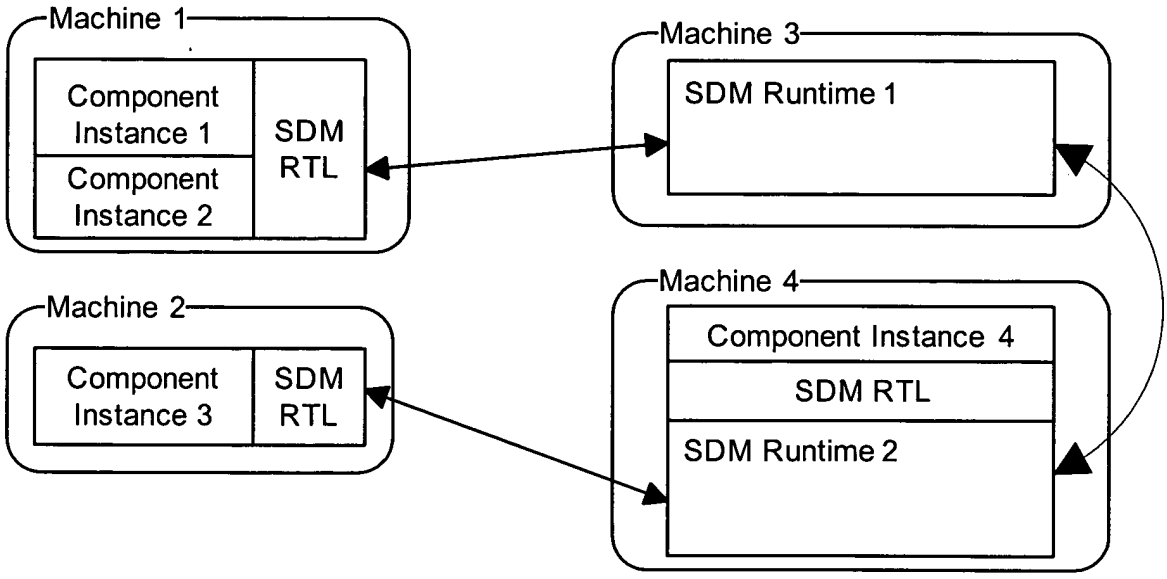

Machine 1
Component Instance 1
Component Instance 2
SDM RTL
Machine 3
SDM Runtime 1
Machine 2
Component Instance 3
SDM RTL
Machine 4
Component Instance 4
SDM RTL
SDM Runtime 2

Fig. 40

Fig. 41

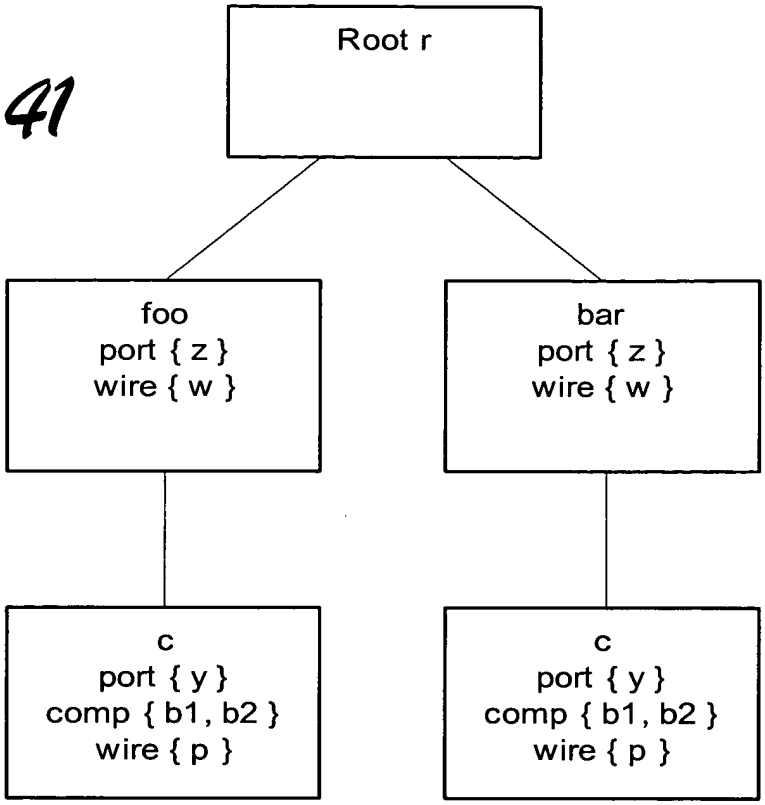
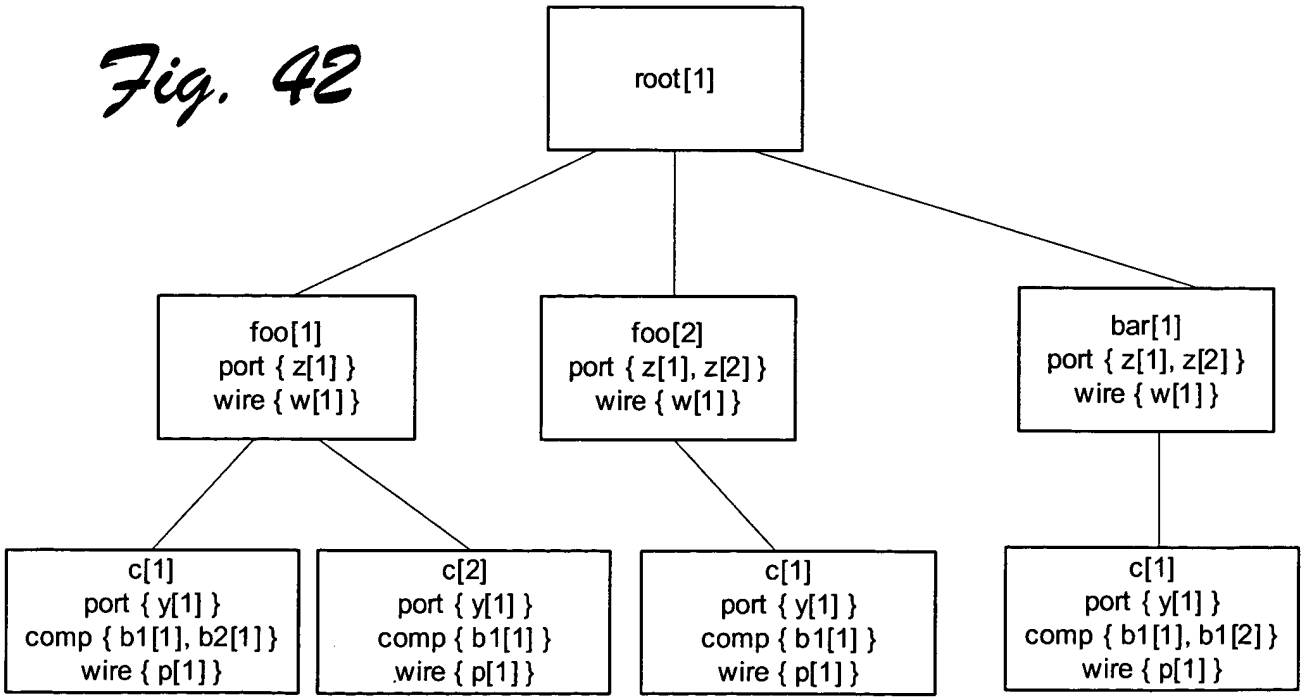

Root r
foo
port { z }
wire { w }
bar
port { z }
wire { w }
c
port { y }
comp { b1, b2 }
wire { p }
c
port { y }
comp { b1, b2 }
wire { p }

Fig. 42


root[1]
foo[1]
port { z[1] }
wire { w[1] }
foo[2]
port { z[1], z[2] }
wire { w[1] }
bar[1]
port { z[1], z[2] }
wire { w[1] }
c[1]
port { y[1] }
comp { b1[1], b2[1] }
wire { p[1] }
c[2]
port { y[1] }
comp { b1[1] }
wire { p[1] }
c[1]
port { y[1] }
comp { b1[1] }
wire { p[1] }
c[1]
port { y[1] }
comp { b1[1], b1[2] }
wire { p[1] }

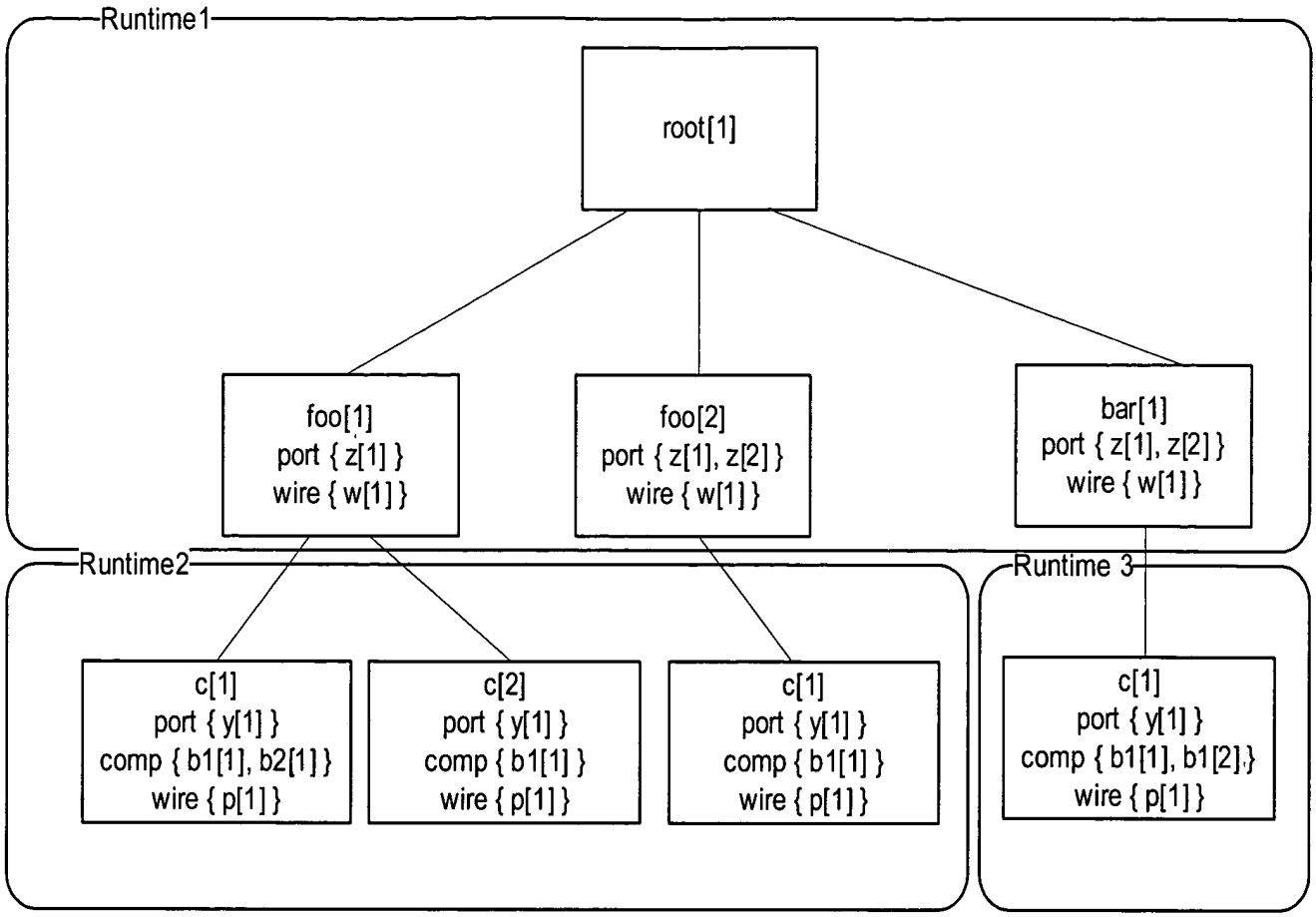

Runtime1
root[1]
foo[1]
port { z[1] }
wire { w[1] }
foo[2]
port { z[1], z[2] }
wire { w[1] }
bar[1]
port { z[1], z[2] }
wire { w[1] }
Runtime2
Runtime 3
c[1]
port { y[1] }
comp { b1[1], b2[1] }
wire { p[1] }
c[2]
port { y[1] }
comp { b1[1] }
wire { p[1] }
c[1]
port { y[1] }
comp { b1[1] }
wire { p[1] }
c[1]
port { y[1] }
comp { b1[1], b1[2] }
wire { p[1] }

Fig. 43

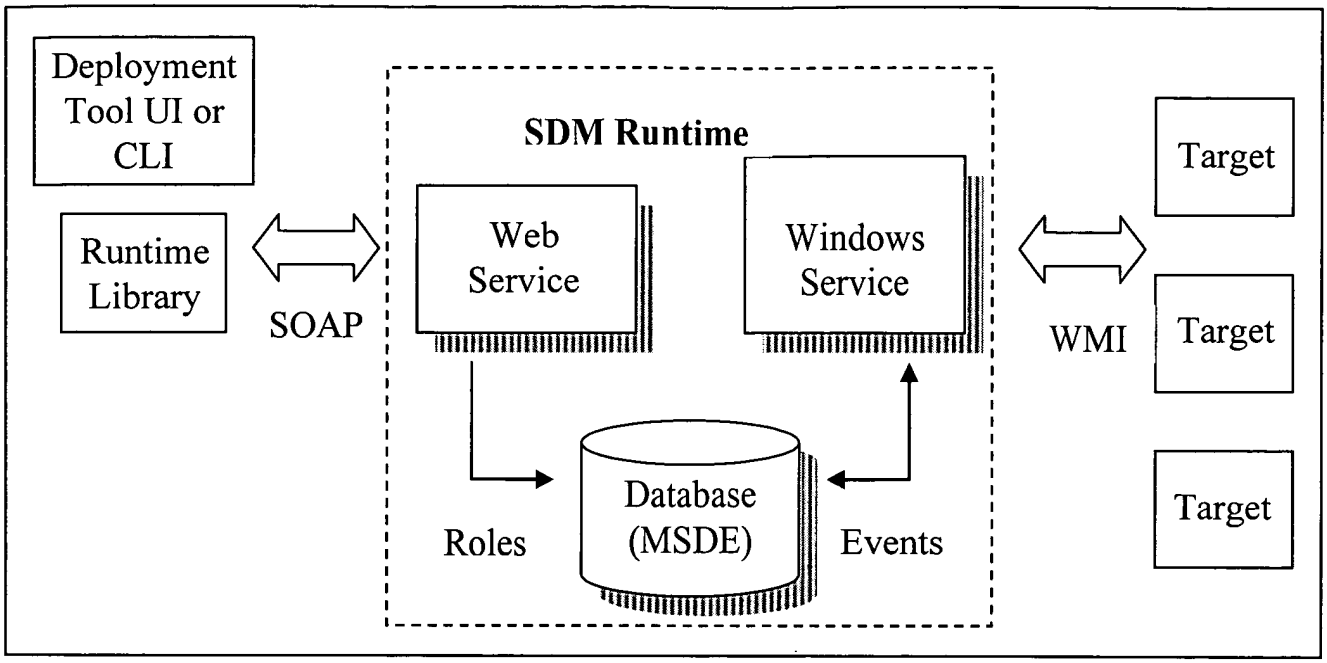

Deployment Tool UI or CLI
Runtime Library
SOAP
SDM Runtime
Web Service
Windows Service
Roles
Database (MSDE)
Events
WMI
Target
Target
Target

Fig. 44

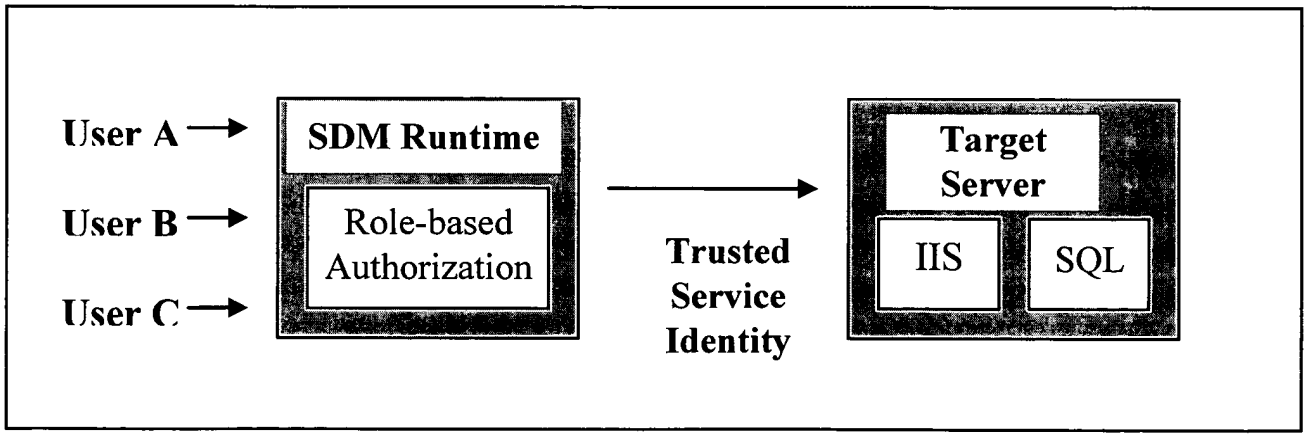

User A
User B
User C
SDM Runtime
Role-based Authorization
Trusted Service Identity
Target Server
IIS
SQL

Fig. 45

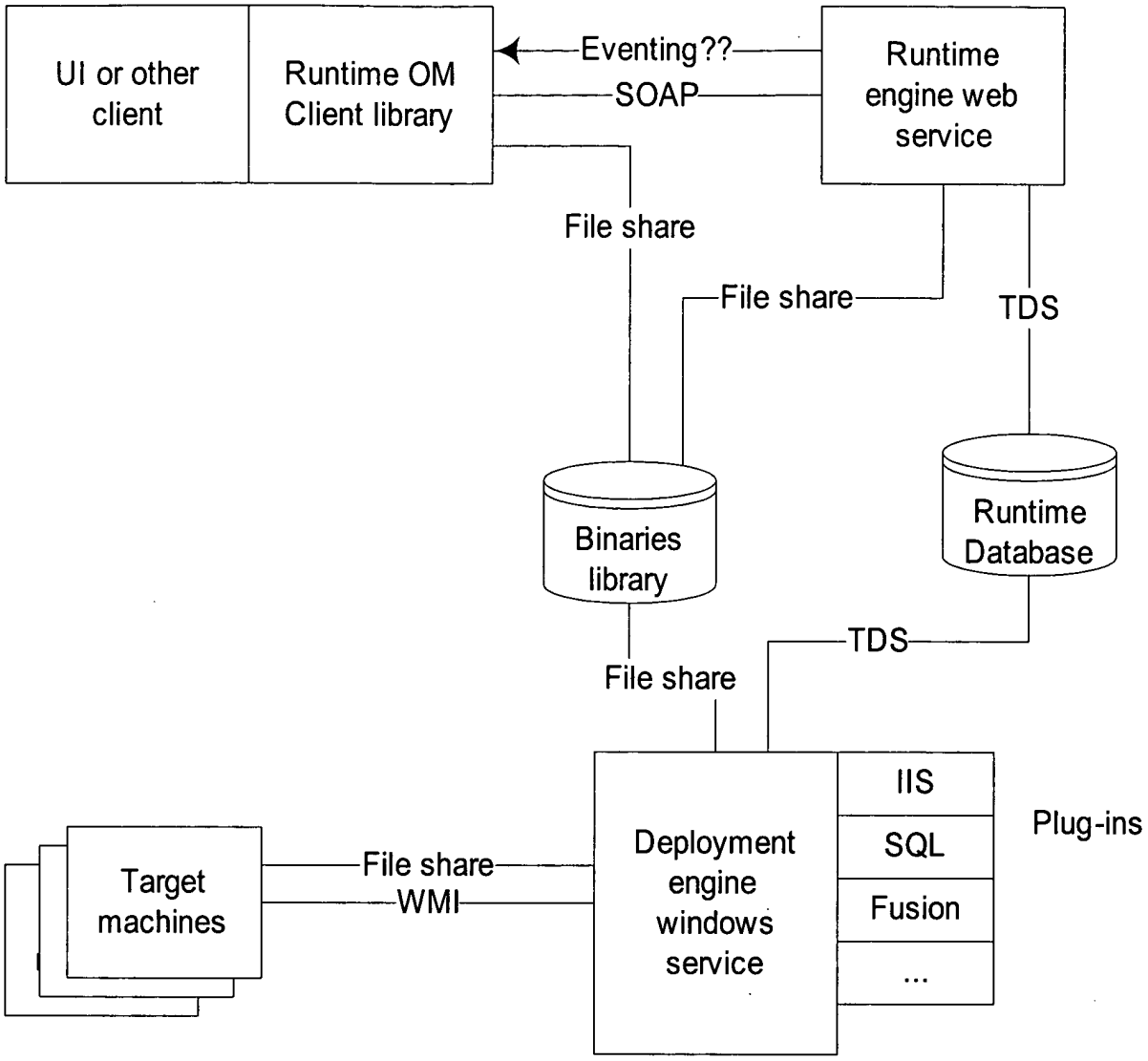

UI or other client
Runtime OM Client library
Eventing??
SOAP
Runtime engine web service
File share
File share
TDS
Binaries library
Runtime Database
TDS
File share
IIS
SQL
Fusion
...
Plug-ins
Deployment engine windows service
Target machines
File share
WMI

Fig. 46

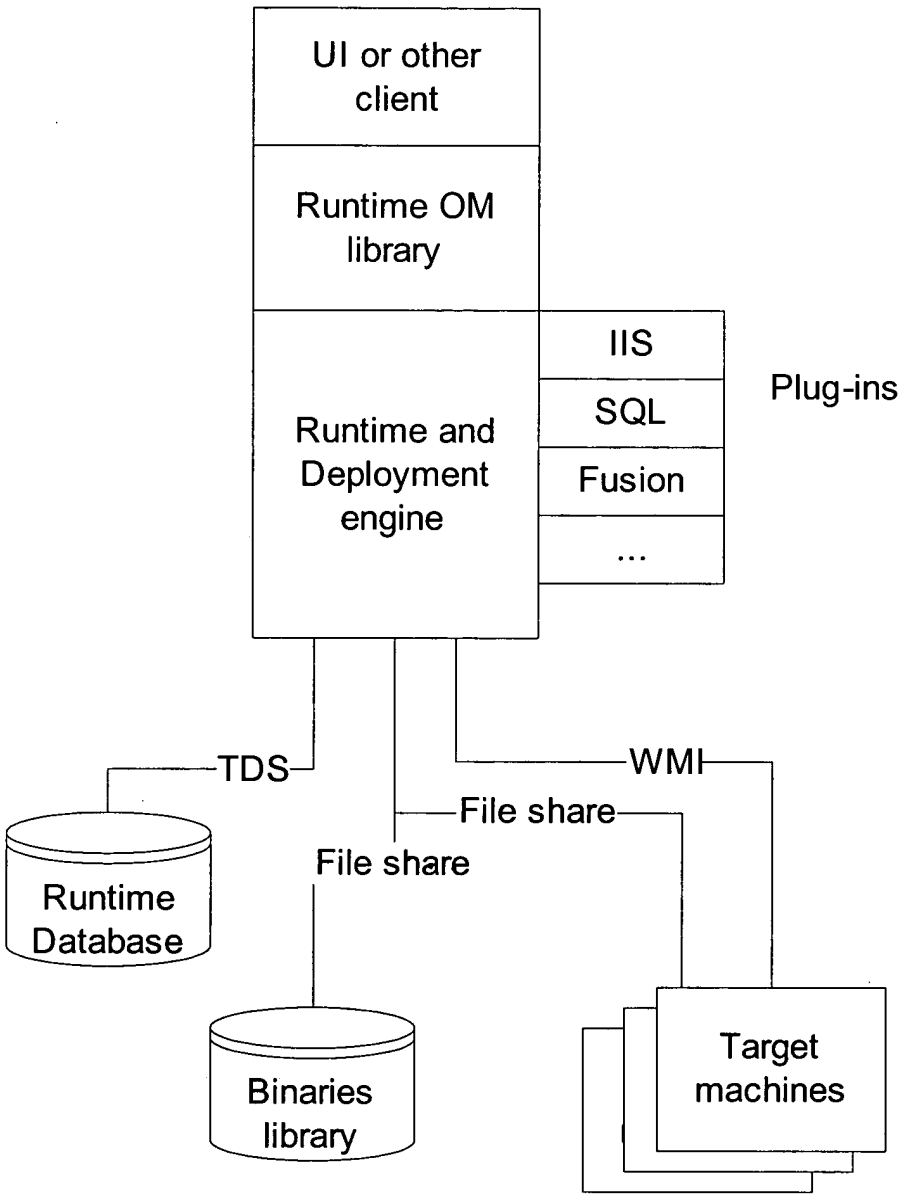

UI or other client
Runtime OM library
Runtime and Deployment engine
IIS
SQL
Fusion
...
Plug-ins
TDS
WMI
File share
File share
Runtime Database
Binaries library
Target machines

Fig. 47

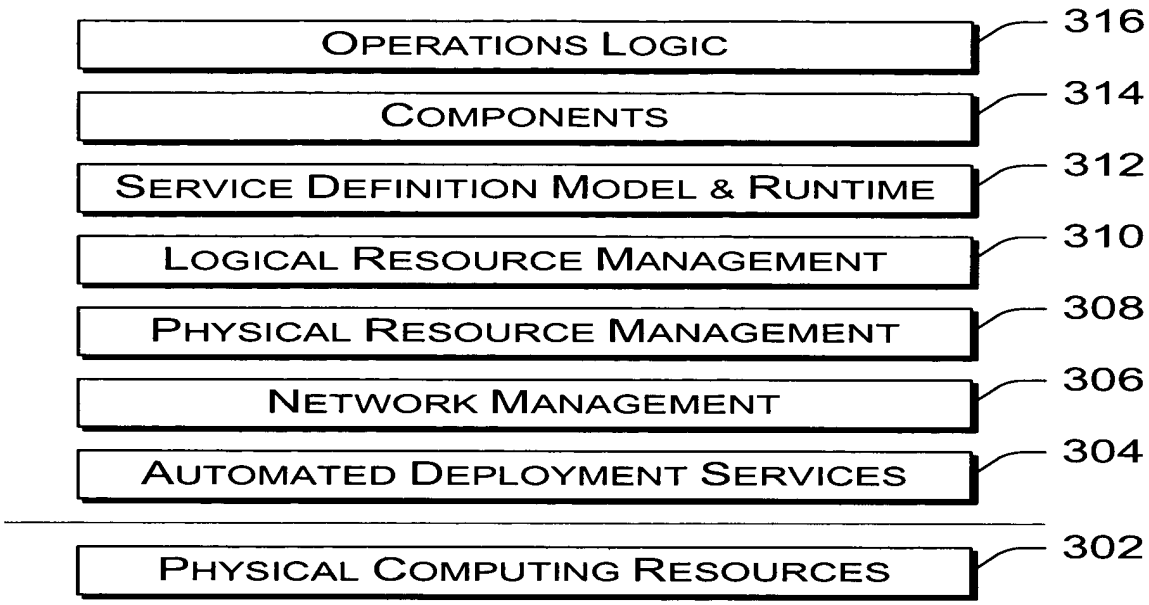

OPERATIONS LOGIC
316
COMPONENTS
314
SERVICE DEFINITION MODEL & RUNTIME
312
LOGICAL RESOURCE MANAGEMENT
310
PHYSICAL RESOURCE MANAGEMENT
308
NETWORK MANAGEMENT
306
AUTOMATED DEPLOYMENT SERVICES
304
PHYSICAL COMPUTING RESOURCES
302

Fig. 48

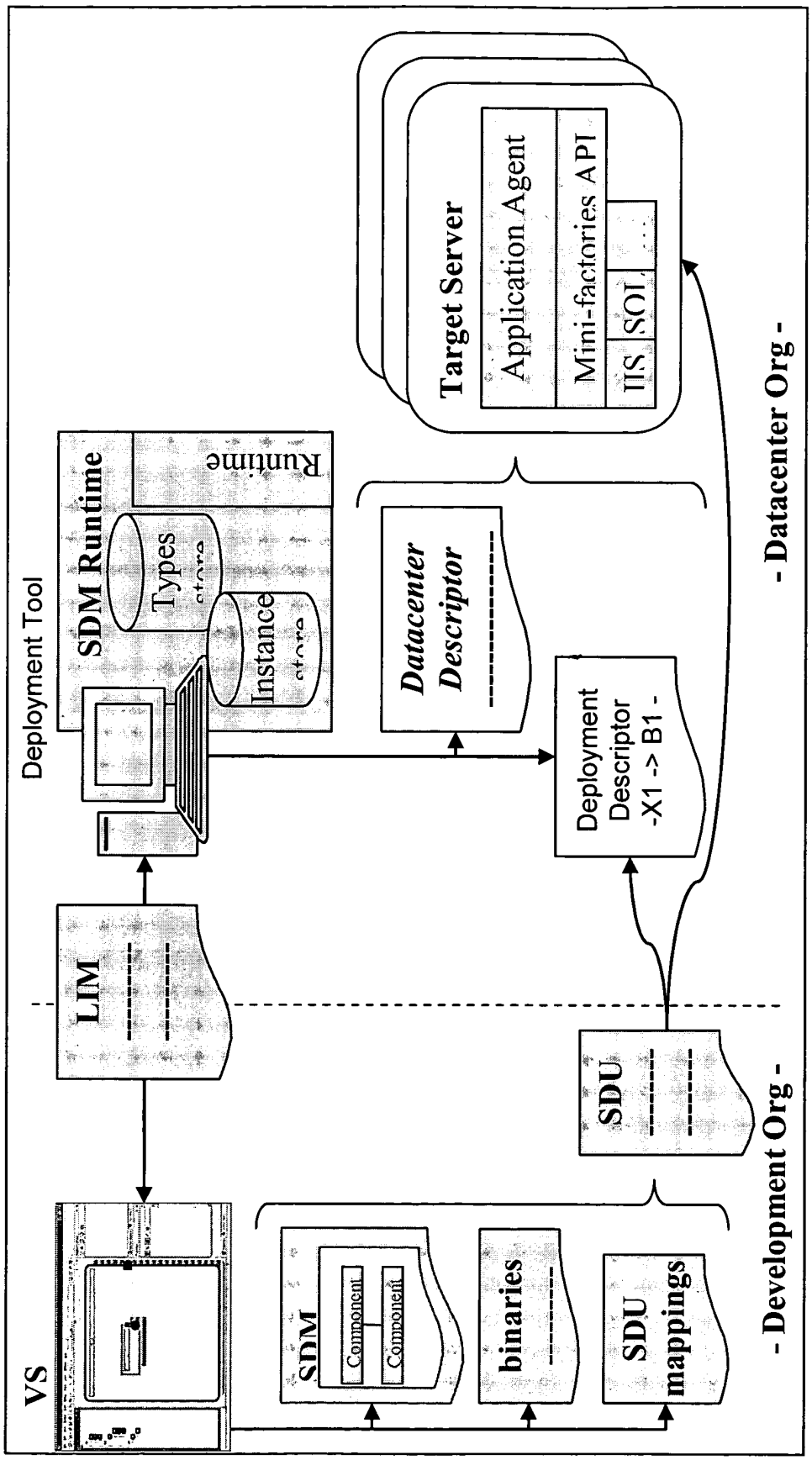

VS
Deployment Tool
LIM
SDM Runtime
Runtime
Types store
Instance store
Target Server
Application Agent
Mini-factories API
IIS
SQL
Datacenter Descriptor
Deployment Descriptor -X1 -> B1 -
SDU
SDM
Component
Component
binaries
SDU mappings
- Development Org -
- Datacenter Org -

Fig. 4G

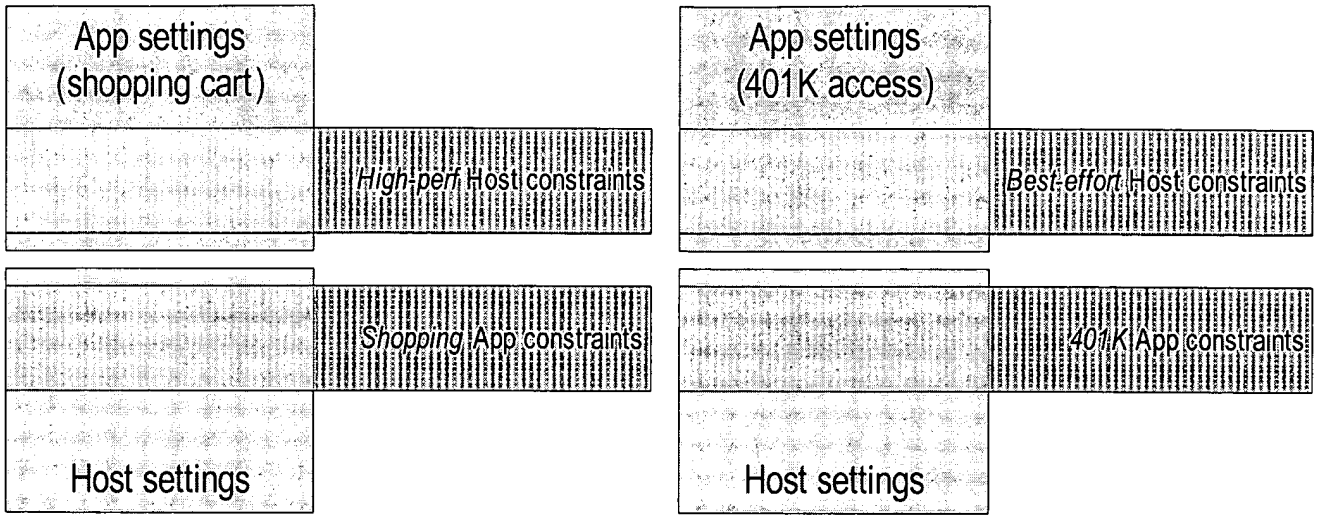


Fig. 50

Initial Phase	App Development Phase	Install Phase	Running Phase
Synch datacenter & LIM	Code/Test versus LIM	Install Application	Scale-out Topology-

Fig. 51

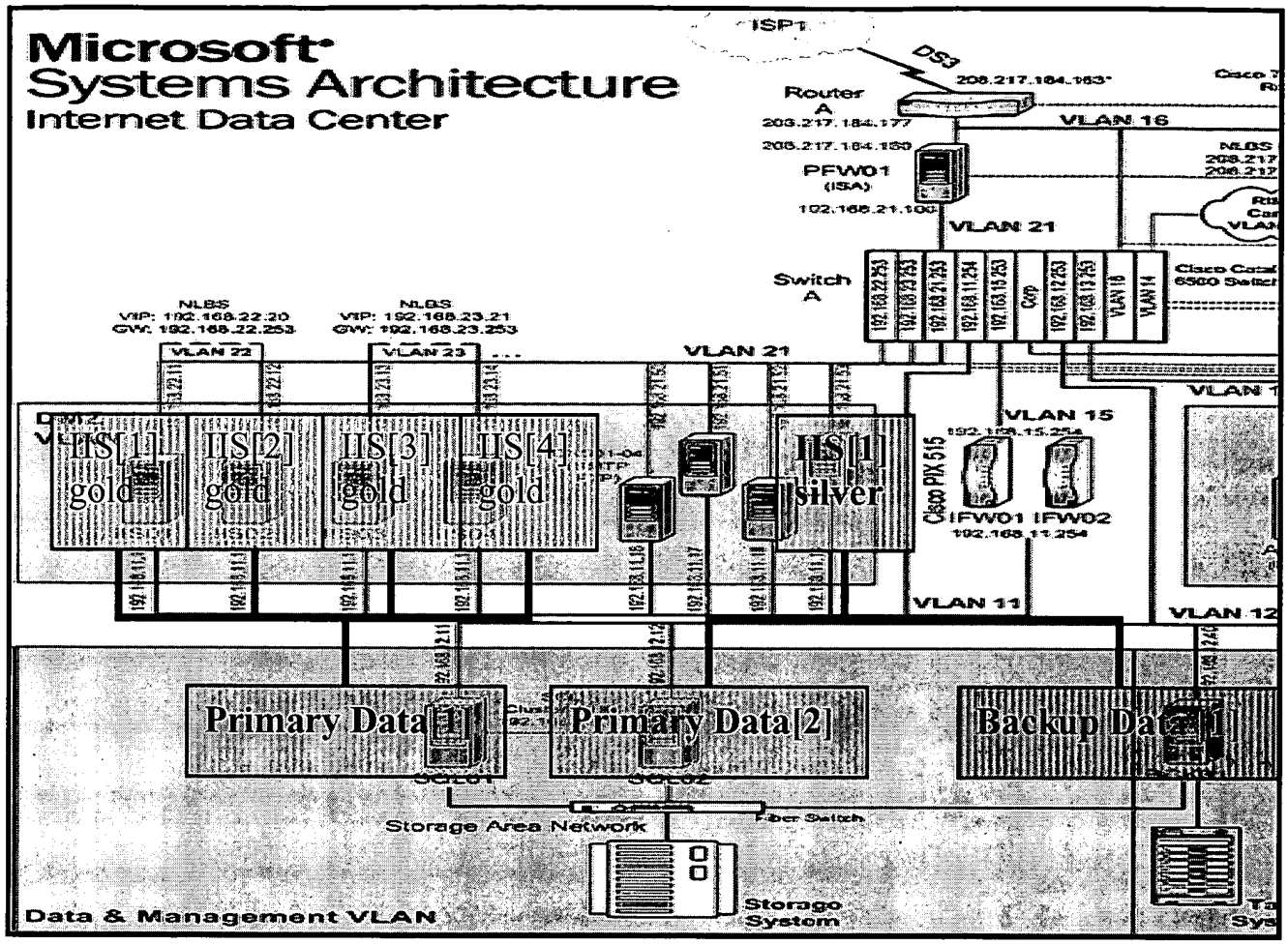

Microsoft
Systems Architecture
Internet Data Center
ISP1
DS3
Router
A
VLAN 16
PFW01
(ISA)
VLAN 21
Switch
A
NLBS
VIP: 192.168.22.20
GW: 192.168.22.253
NLBS
VIP: 192.168.23.21
GW: 192.168.23.253
VLAN 22
VLAN 23
VLAN 21
VLAN 15
IIS[1]
gold
IIS[2]
gold
IIS[3]
gold
IIS[4]
gold
IIS[1]
silver
Cisco PIX 515
IFW01 IFW02
VLAN 11
VLAN 12
Primary Data[1]
Primary Data[2]
Backup Data[1]
Storage Area Network
Fiber Switch
Storage
System
Data & Management VLAN

Fig. 52

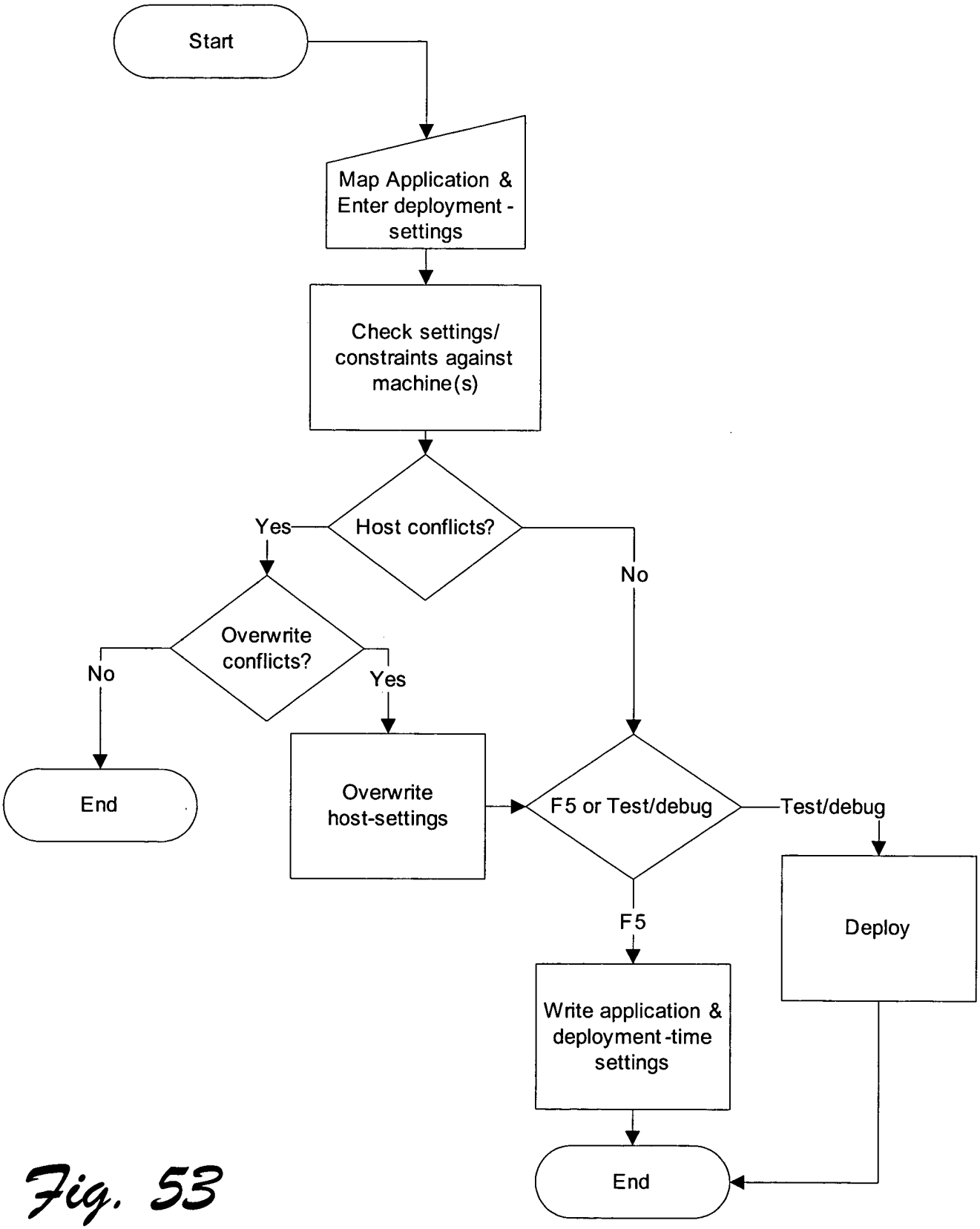

Start
Map Application & Enter deployment - settings
Check settings/ constraints against machine(s)
Host conflicts?
Yes
No
Overwrite conflicts?
No
Yes
End
Overwrite host-settings
F5 or Test/debug
Test/debug
F5
Deploy
Write application & deployment-time settings
End

Fig. 53

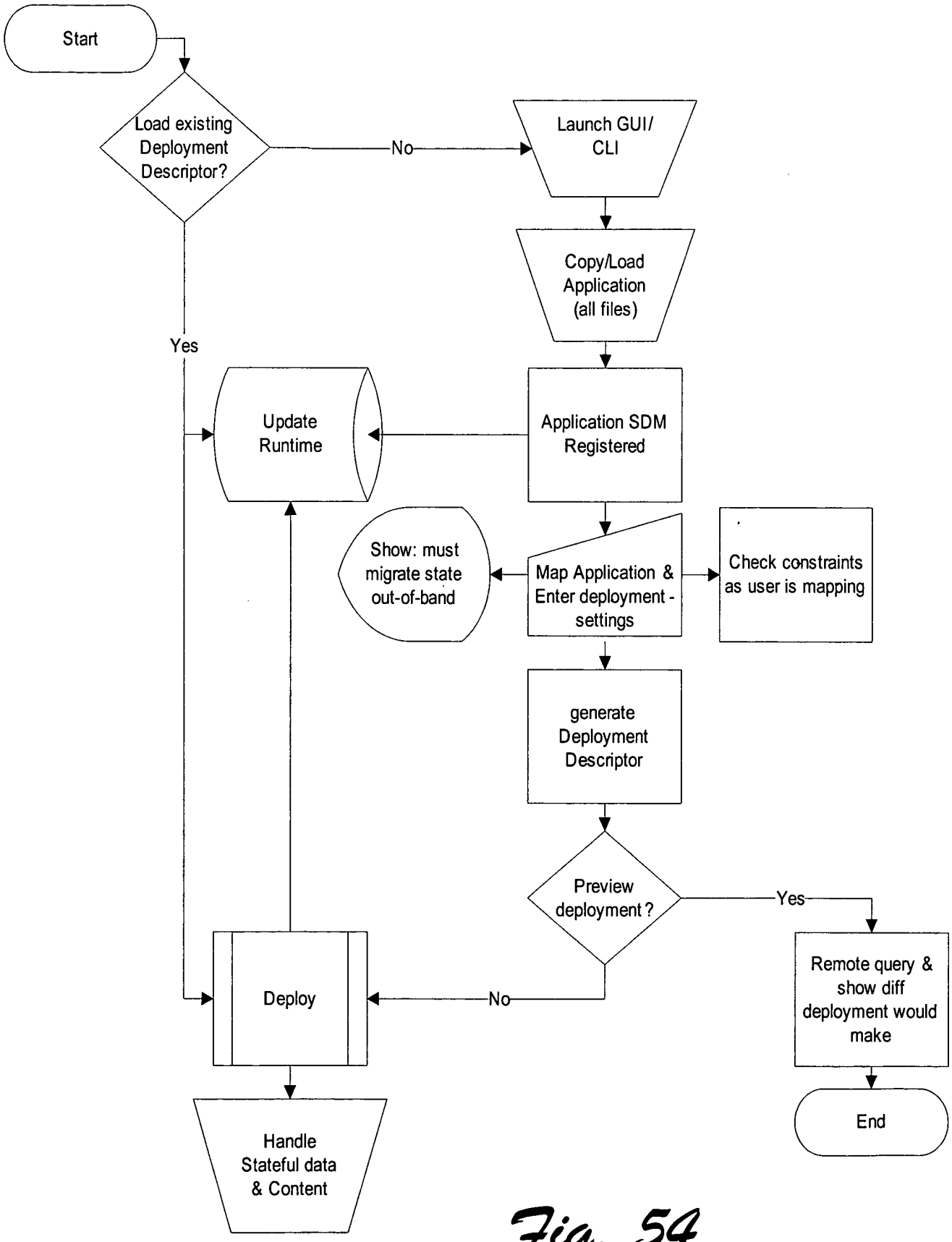

Start
Load existing Deployment Descriptor?
No
Launch GUI/ CLI
Copy/Load Application (all files)
Yes
Update Runtime
Application SDM Registered
Show: must migrate state out-of-band
Map Application & Enter deployment - settings
Check constraints as user is mapping
generate Deployment Descriptor
Preview deployment ?
Yes
Remote query & show diff deployment would make
End
Deploy
No
Handle Stateful data & Content

Fig. 54

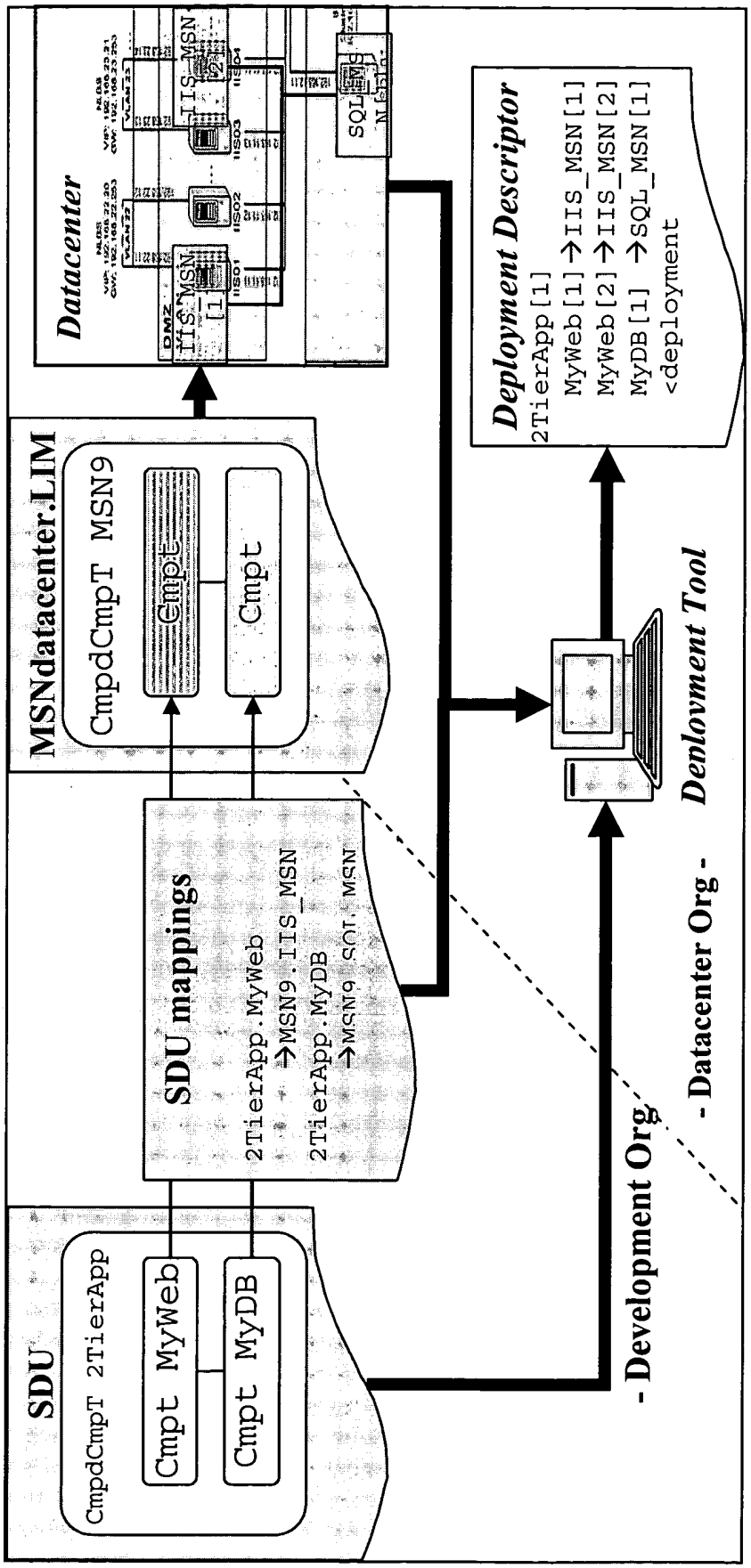

SDU
CmpdCmpT 2TierApp
Cmpt MyWeb
Cmpt MyDB
SDU mappings
2TierApp.MyWeb
→MSN9.IIS_MSN
2TierApp.MyDB
→MSN9.SQL_MSN
MSNdatacenter.LIM
CmpdCmpT MSN9
Cmpt
Cmpt
Datacenter
DMZ
IIS_MSN
[1]
IIS_MSN
[2]
SQL_MSN
Deployment Descriptor
2TierApp[1]
MyWeb[1]→IIS_MSN[1]
MyWeb[2]→IIS_MSN[2]
MyDB[1] →SQL_MSN[1]
<deployment
- Development Org -
- Datacenter Org -
Deployment Tool

Fig. 55

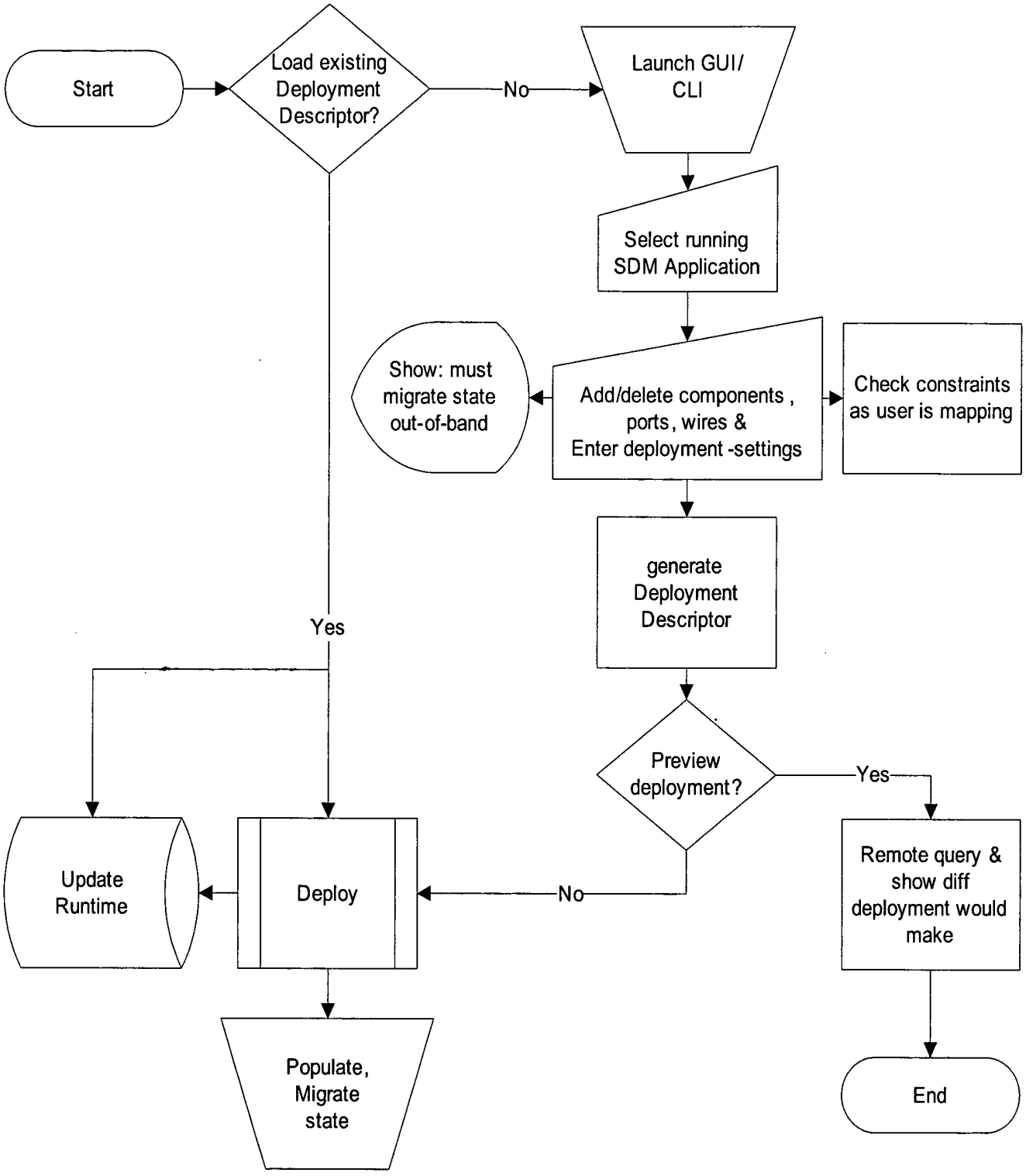

Start
Load existing Deployment Descriptor?
No
Launch GUI/ CLI
Select running SDM Application
Show: must migrate state out-of-band
Add/delete components , ports, wires & Enter deployment -settings
Check constraints as user is mapping
generate Deployment Descriptor
Yes
Preview deployment?
Yes
Update Runtime
Deploy
No
Remote query & show diff deployment would make
Populate, Migrate state
End

Fig. 56

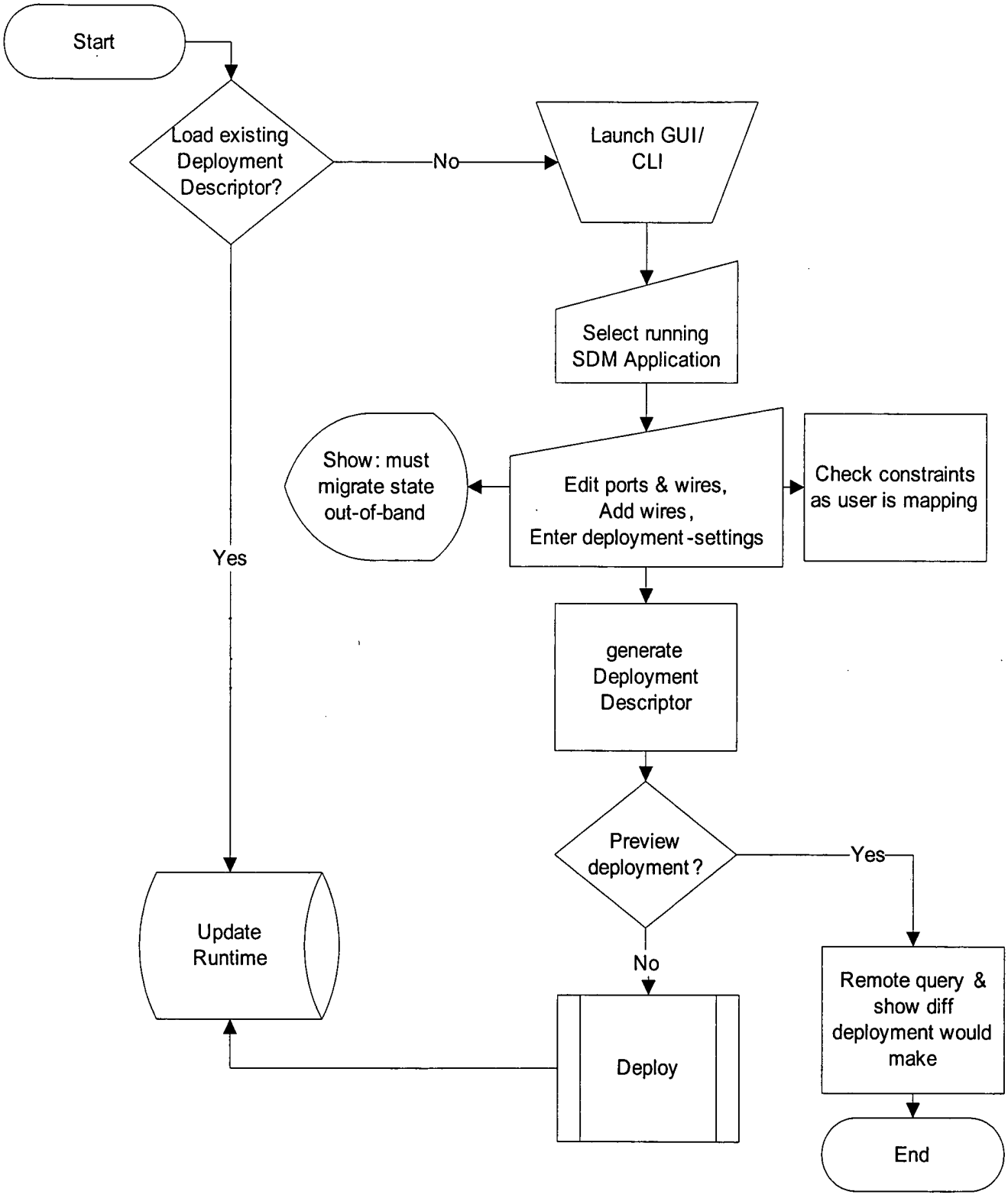

Start
Load existing Deployment Descriptor?
No
Launch GUI/ CLI
Select running SDM Application
Show: must migrate state out-of-band
Edit ports & wires, Add wires, Enter deployment-settings
Check constraints as user is mapping
Yes
generate Deployment Descriptor
Preview deployment?
Yes
No
Update Runtime
Deploy
Remote query & show diff deployment would make
End

Fig. 57

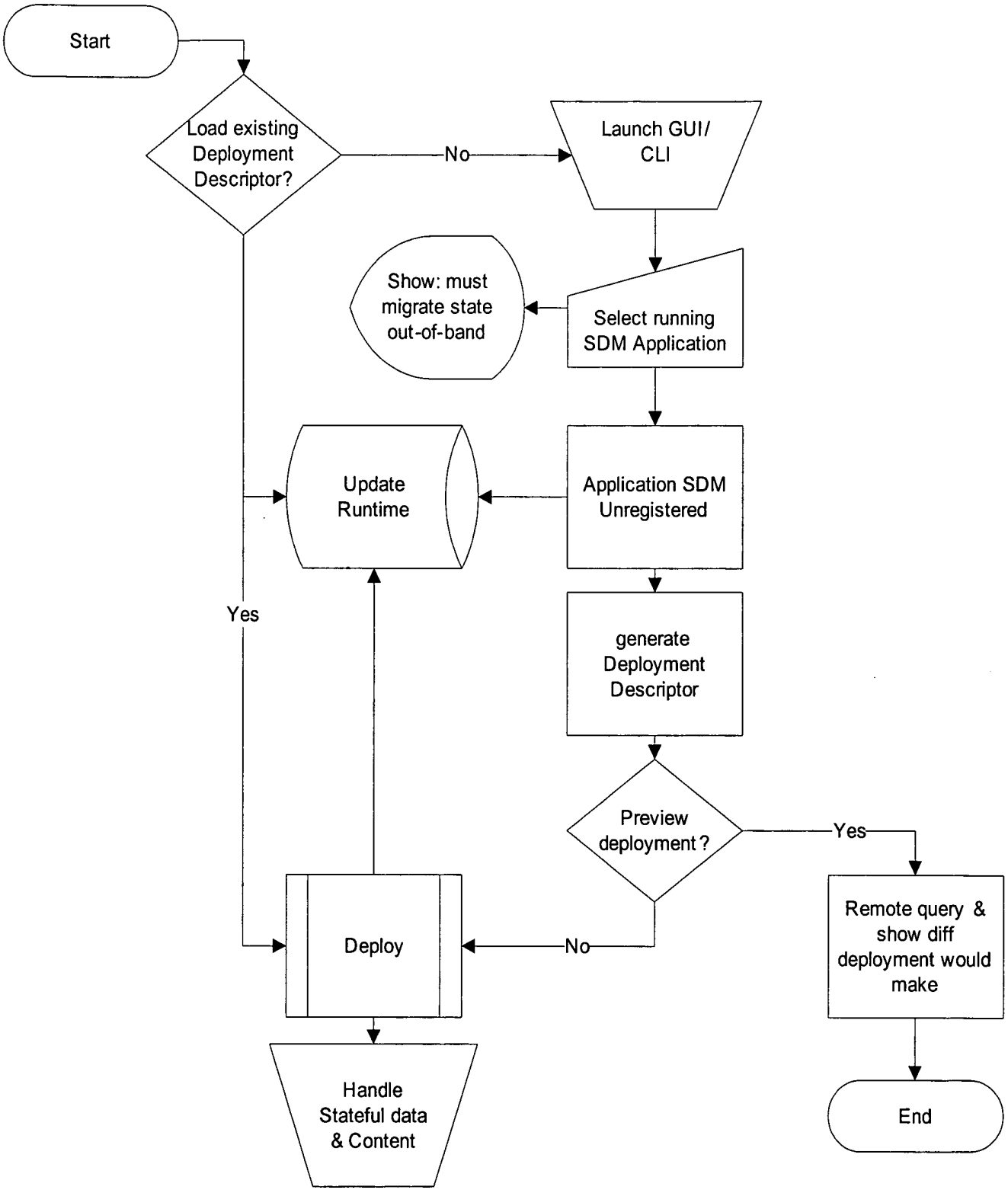

Start
Load existing Deployment Descriptor?
No
Launch GUI/ CLI
Show: must migrate state out-of-band
Select running SDM Application
Update Runtime
Application SDM Unregistered
Yes
generate Deployment Descriptor
Preview deployment?
Yes
Remote query & show diff deployment would make
Deploy
No
Handle Stateful data & Content
End

Fig. 58

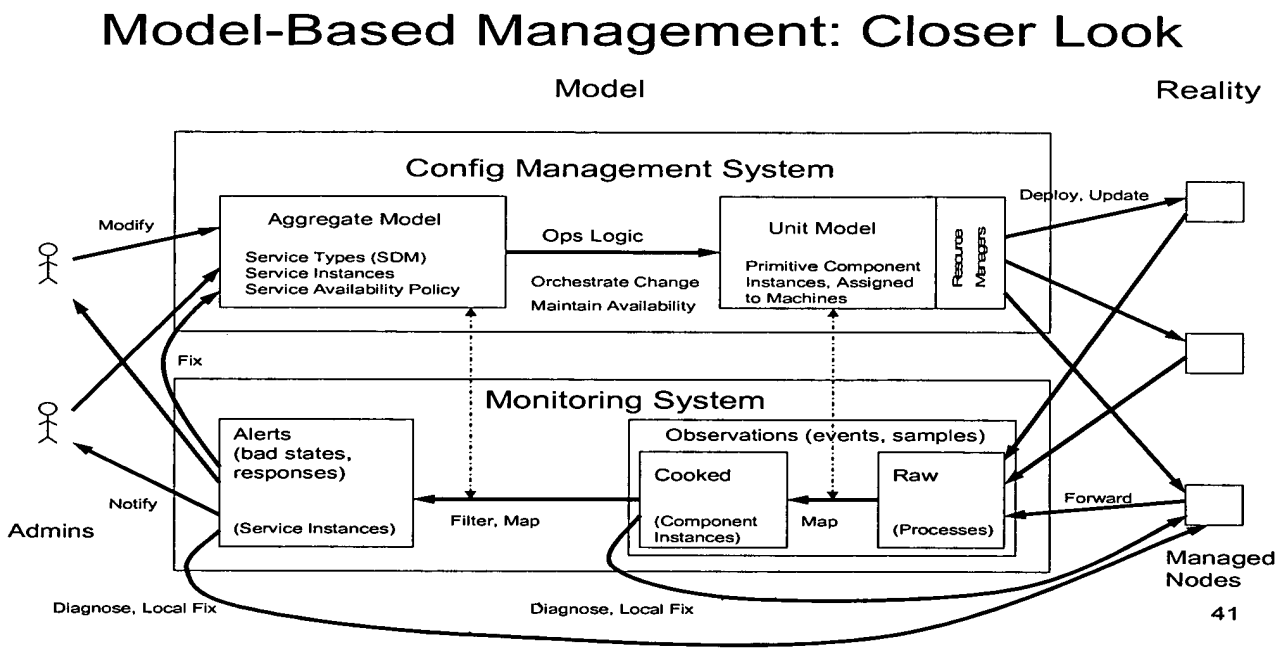

Model-Based Management: Closer Look
Model
Reality
Config Management System
Modify
Aggregate Model
Service Types (SDM)
Service Instances
Service Availability Policy
Ops Logic
Orchestrate Change
Maintain Availability
Unit Model
Primitive Component Instances, Assigned to Machines
Resource Managers
Deploy, Update
Fix
Monitoring System
Alerts
(bad states, responses)
(Service Instances)
Filter, Map
Observations (events, samples)
Cooked
(Component Instances)
Map
Raw
(Processes)
Forward
Notify
Admins
Managed Nodes
Diagnose, Local Fix
Diagnose, Local Fix
41

Fig. 59

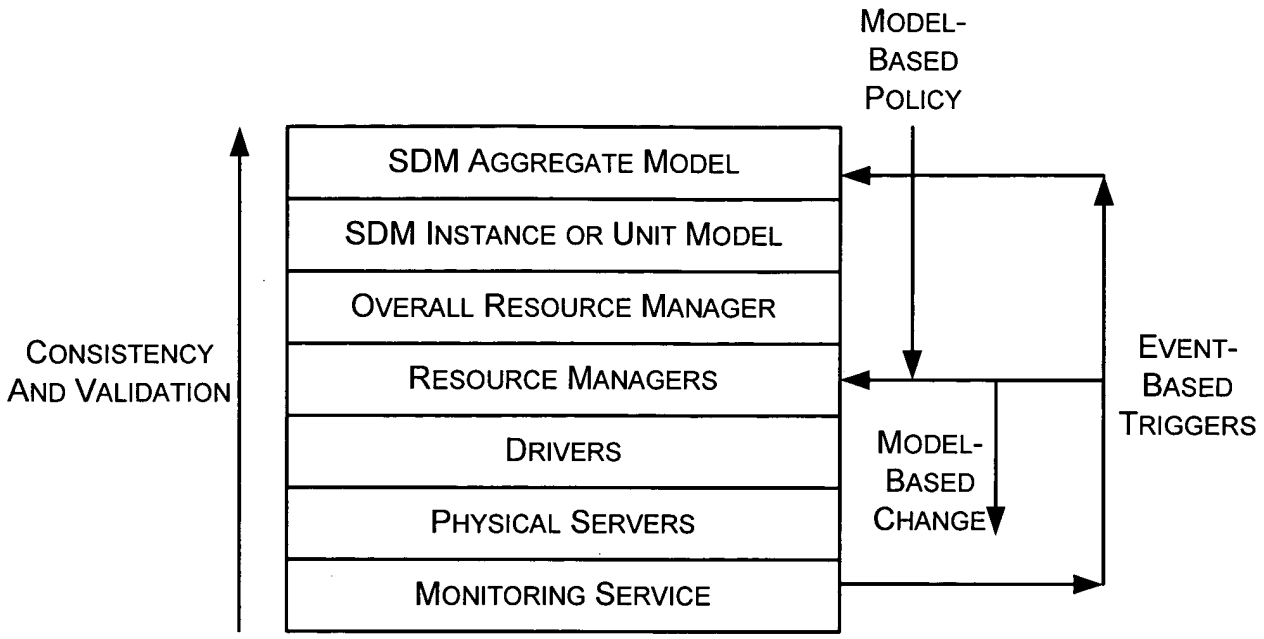

MODEL-BASED POLICY
SDM AGGREGATE MODEL
SDM INSTANCE OR UNIT MODEL
OVERALL RESOURCE MANAGER
RESOURCE MANAGERS
DRIVERS
PHYSICAL SERVERS
MONITORING SERVICE
CONSISTENCY AND VALIDATION
EVENT-BASED TRIGGERS
MODEL-BASED CHANGE

Fig. 60

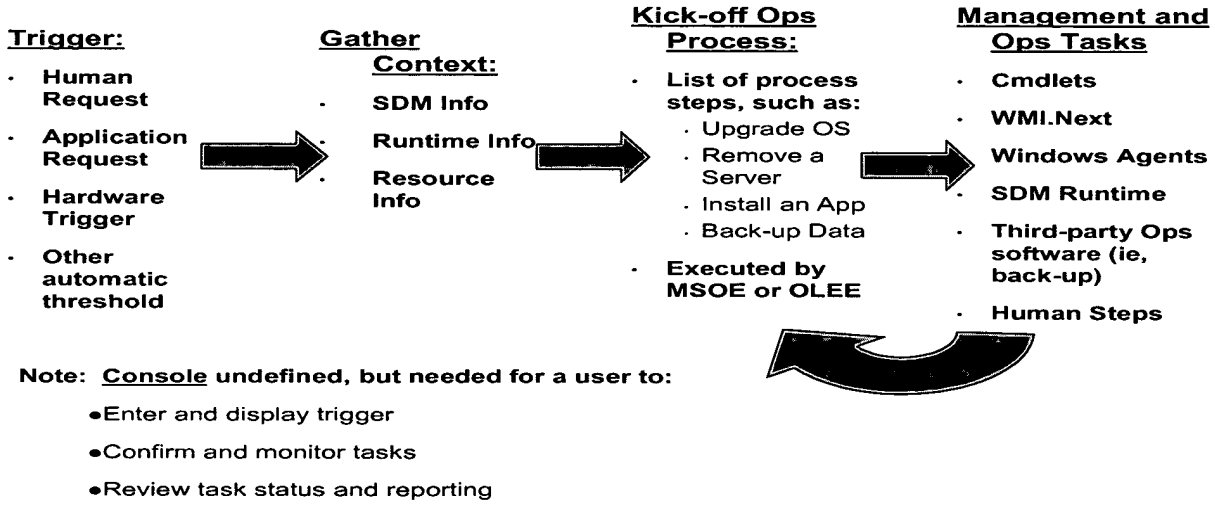

Trigger:
Human Request
Application Request
Hardware Trigger
Other automatic threshold
Gather Context:
SDM Info
Runtime Info
Resource Info
Kick-off Ops Process:
List of process steps, such as:
Upgrade OS
Remove a Server
Install an App
Back-up Data
Executed by MSOE or OLEE
Management and Ops Tasks
Cmdlets
WMI.Next
Windows Agents
SDM Runtime
Third-party Ops software (ie, back-up)
Human Steps
Note: Console undefined, but needed for a user to:
•Enter and display trigger
•Confirm and monitor tasks
•Review task status and reporting

Fig. 61

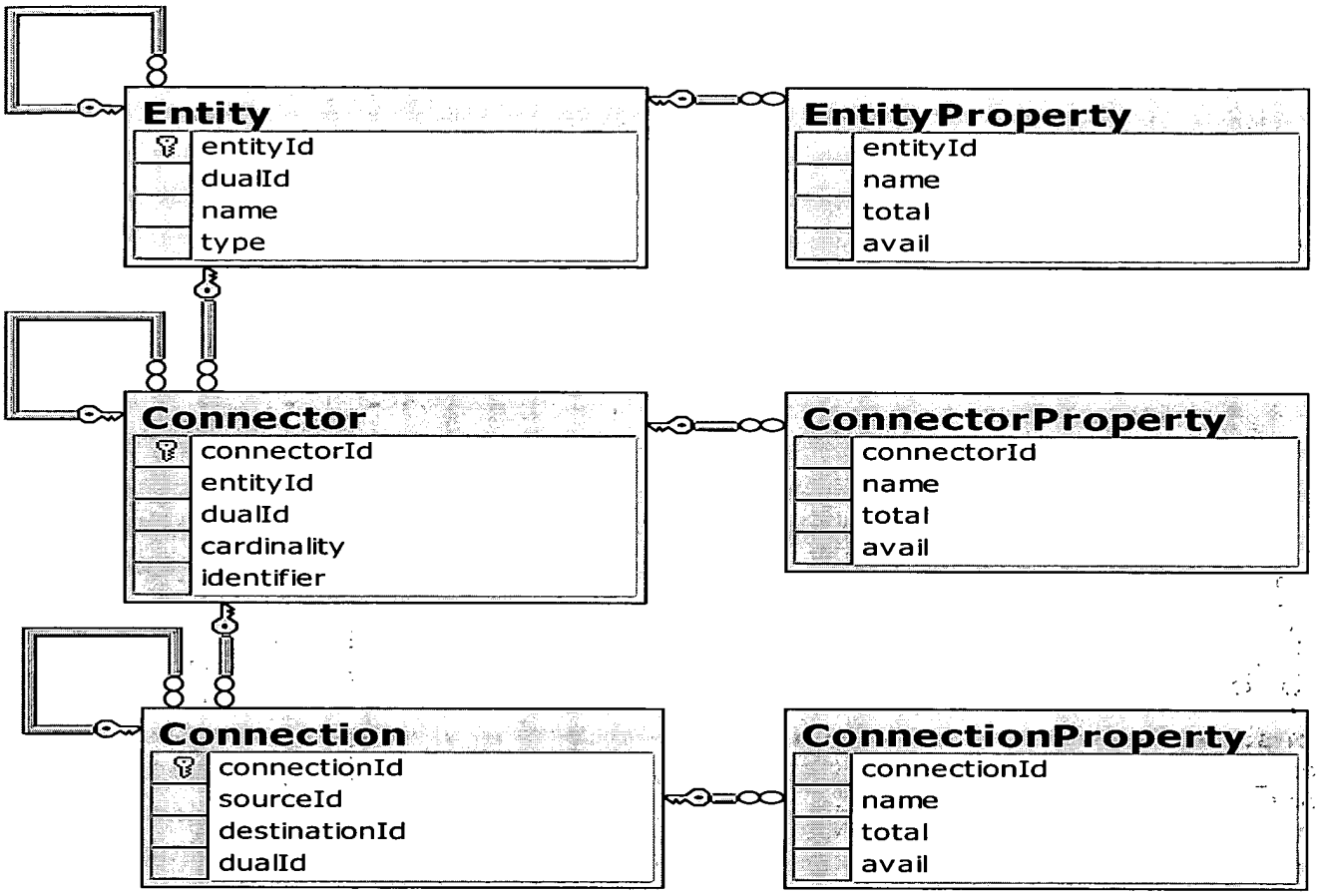

Entity
entityId
dualId
name
type
EntityProperty
entityId
name
total
avail
Connector
connectorId
entityId
dualId
cardinality
identifier
ConnectorProperty
connectorId
name
total
avail
Connection
connectionId
sourceId
destinationId
dualId
ConnectionProperty
connectionId
name
total
avail

Fig. 62

Room 42/4814,
Power Grid 4800

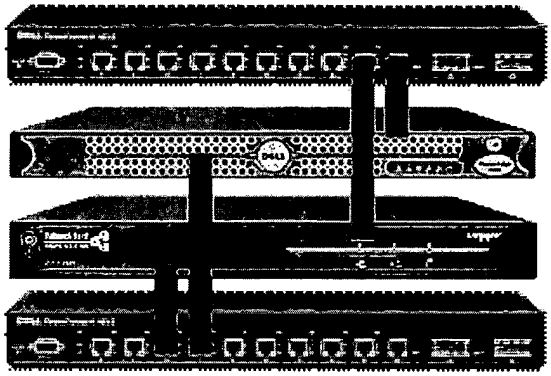


Fig. 63

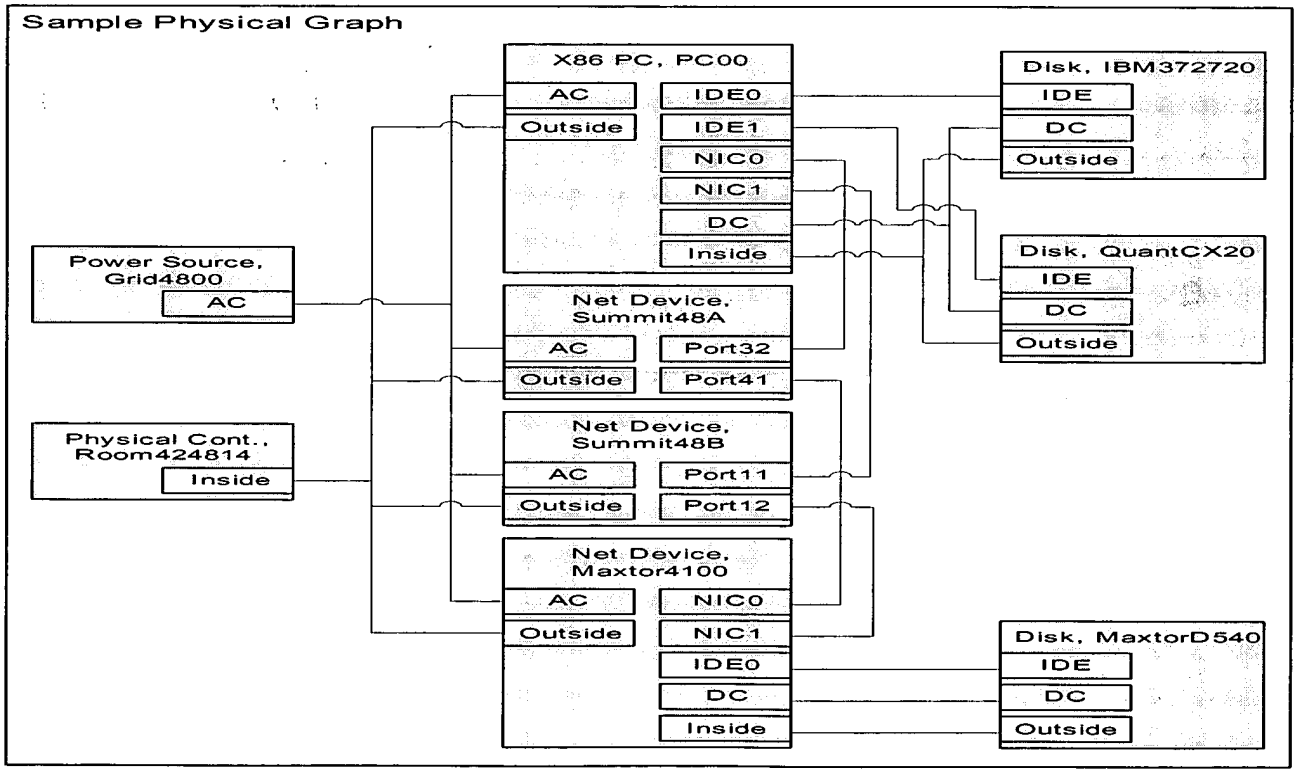


Fig. 64

ID	Src	Dst	Dual	Category	Name	Driver Identifier	Unique Identifier	Cardir	Notes
1				Power Source	Grid4800				Physical Entities / Entities
2				Physical Container	Room424814				
3				X86 PC	PC00				
4				Disk	IBM372720				
5				Disk	QuantCX20				
6			7	Network Device	Summit48A				
7			6	Network Device	Summit48B				
8				Network Device	Maxtor4100				
9				Disk	MaxtorD540X				
10	1			Power	AC Outlets				Phy / Connectors
11	2			Physical	Inside				
12	3			ATA	IDE0			2	PCConnectors
13	3			ATA	IDE1			2	
14	3		15	Ethernet	NIC0		mac:00-B0-D0-20-3F-32	1	
15	3		14	Ethernet	NIC1		mac:00-A0-C9-A0-0B-06	1	
16	3			Power	DC Connector				
17	3			Power	AC Connector			1	
18	3			Physical	Outside				
19	3			Physical	Inside			3	
20	4			ATA	Port			1	Disk
21	4			Power	DC Connector				
22	4			Physical	Outside				
23	5			ATA	Port			1	Disk
24	5			Power	DC Connector				
25	5			Physical	Outside				
26	6		30	Ethernet	Port 32			1	Switch
27	6		31	Ethernet	Port 41			1	
28	6			Power	AC Connector				
29	6			Physical	Outside				
30	7		26	Ethernet	Port 11			1	Switch
31	7		27	Ethernet	Port 12			1	
32	7			Power	AC Connector				
33	7			Physical	Outside				
34	8		35	Ethernet	NIC0		mac:00-A0-29-FE-CA-20	1	NAS
35	8		34	Ethernet	NIC1		mac:00-A0-29-FE-CA-21	1	
36	8			ATA	IDE0			2	
37	8			Power	DC Connector				
38	8			Power	AC Connector				
39	8			Physical	Outside				
40	8			Physical	Inside			3	
41	9			ATA	Port			1	Disk
42	9			Power	DC Connector				
43	9			Physical	Outside				
44	26	14	45	Ethernet	Wire0				PCto Envir. / Connections
45	30	15	44	Ethernet	Wire1				
46	10	17		Power	Cord0				
47	11	18		Physical	Contained				
48	12	20		ATA	Cable				Disk to PC
49	16	21		Power	DC Cable				
50	19	22		Physical	Internal				
51	13	23		ATA	Cable				Disk to PC
52	16	24		Power	DC Cable				
53	19	25		Physical	Internal				
54	27	34	55	Ethernet	Wire2				NAS to Env.
55	31	35	54	Ethernet	Wire3				
56	10	38		Power	Cord0				
57	11	39		Physical	Contained				
58	36	41		ATA	Cable				Disk to NAS
59	37	42		Power	Cable				
60	40	43		Physical	Internal				

Fig. 65

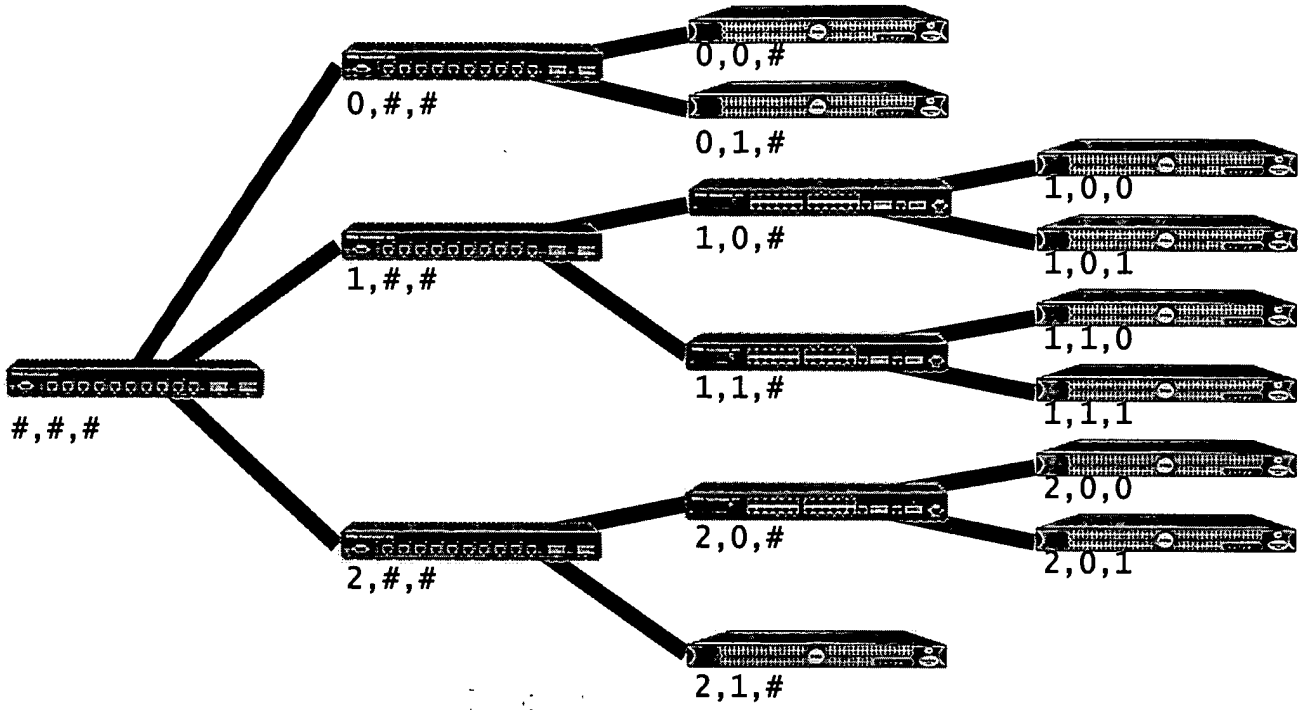


Fig. 66

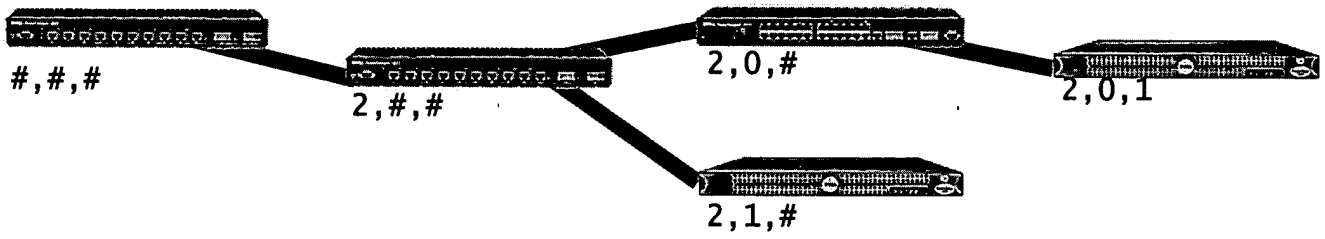


Fig. 67

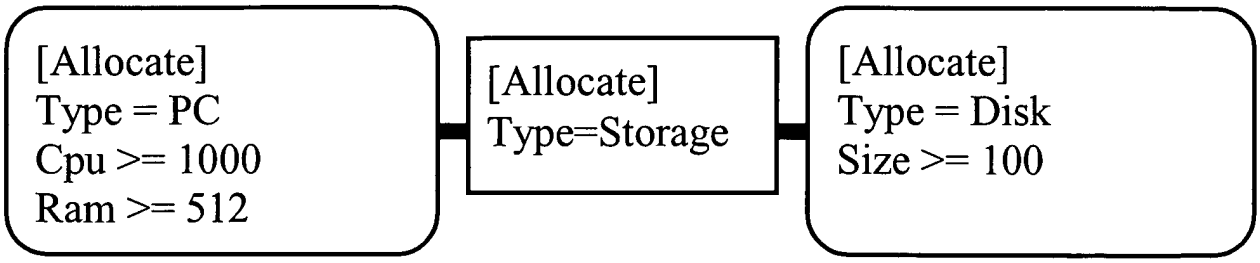


Fig. 68

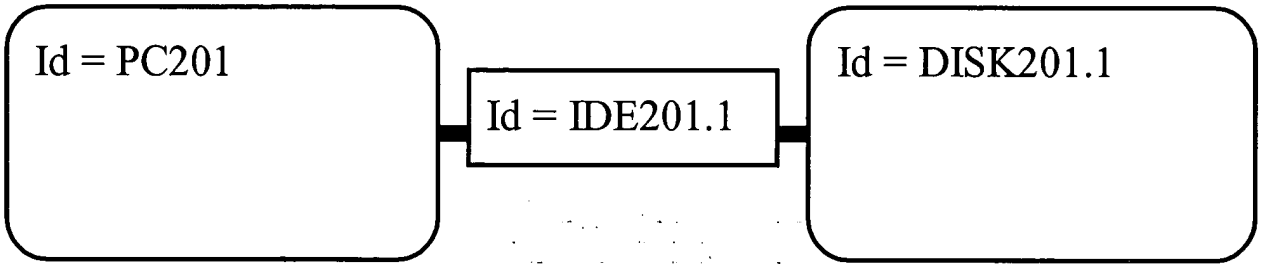


Fig. 69

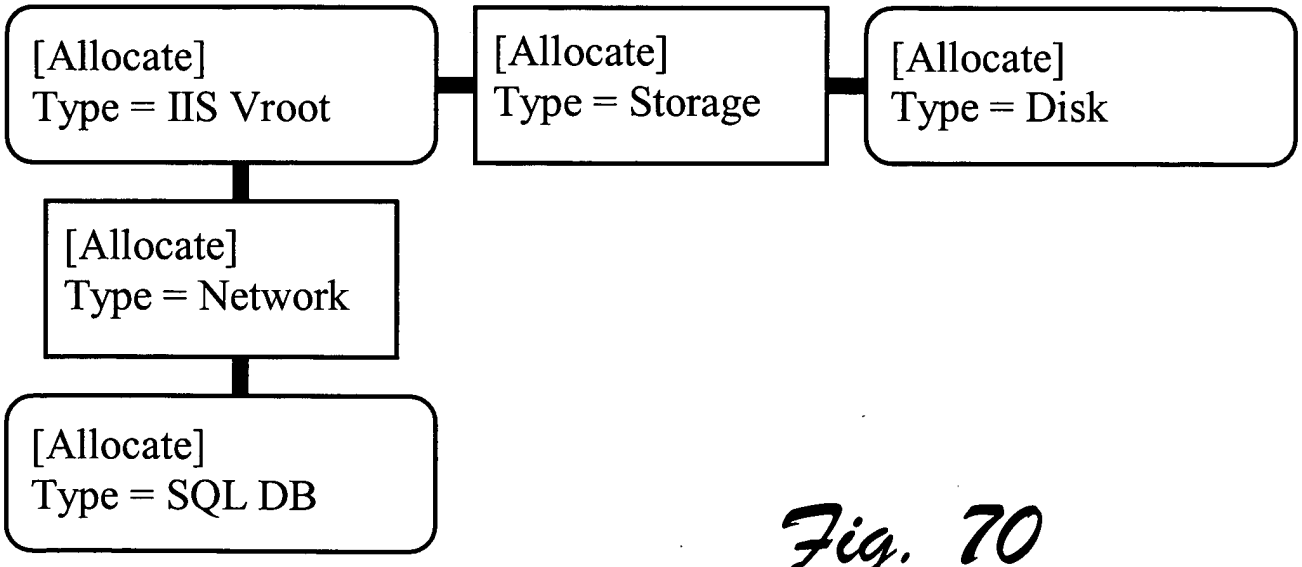


Fig. 70

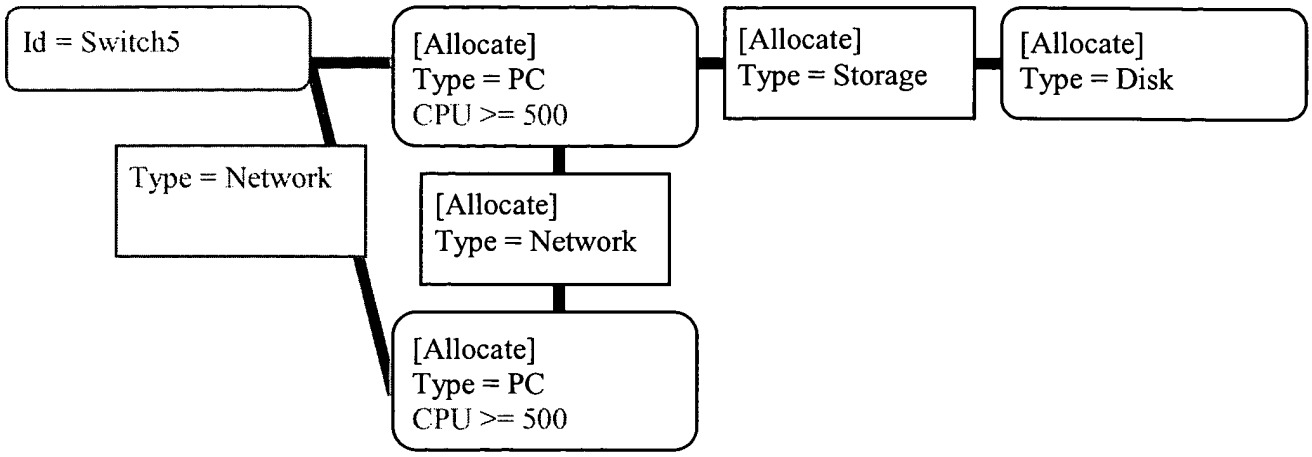

Id = Switch5
[Allocate]
Type = PC
CPU >= 500
[Allocate]
Type = Storage
[Allocate]
Type = Disk
Type = Network
[Allocate]
Type = Network
[Allocate]
Type = PC
CPU >= 500

Fig. 71

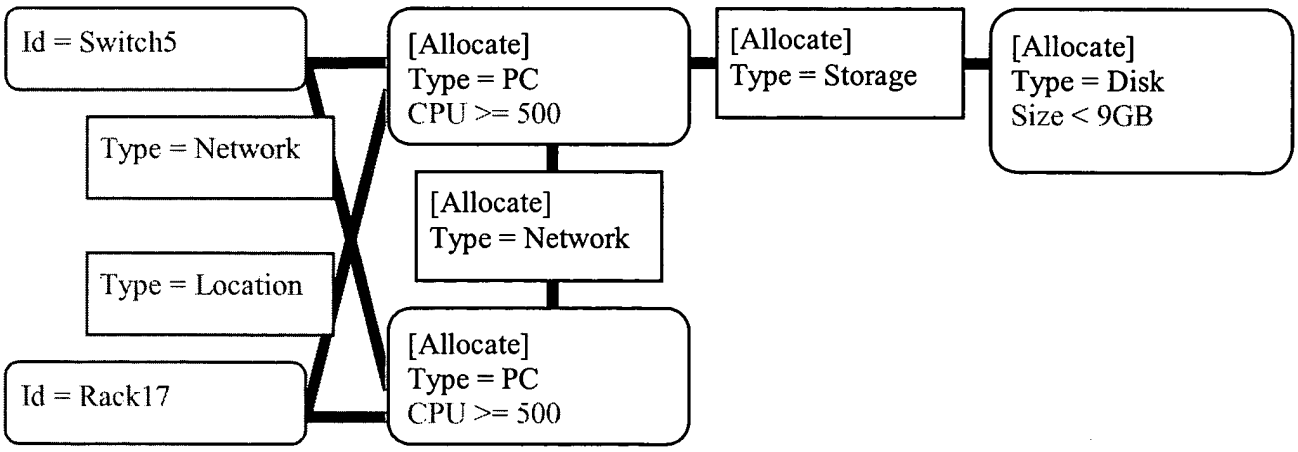

Id = Switch5
[Allocate]
Type = PC
CPU >= 500
[Allocate]
Type = Storage
[Allocate]
Type = Disk
Size < 9GB
Type = Network
[Allocate]
Type = Network
Type = Location
[Allocate]
Type = PC
CPU >= 500
Id = Rack17

Fig. 72

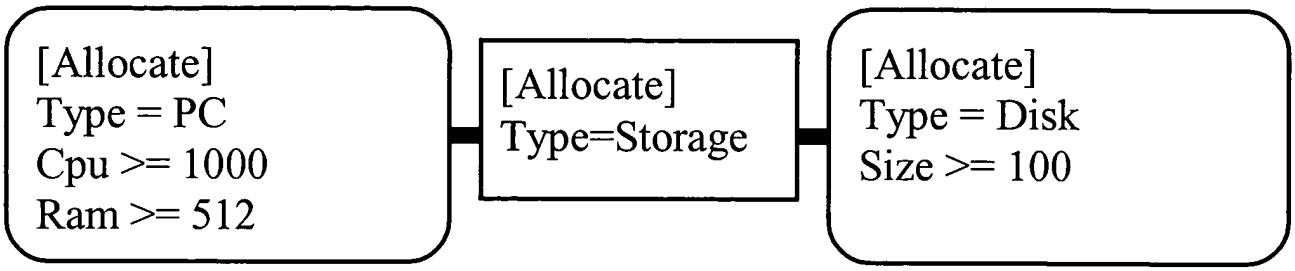

[Allocate]
Type = PC
Cpu >= 1000
Ram >= 512
[Allocate]
Type=Storage
[Allocate]
Type = Disk
Size >= 100

Fig. 73

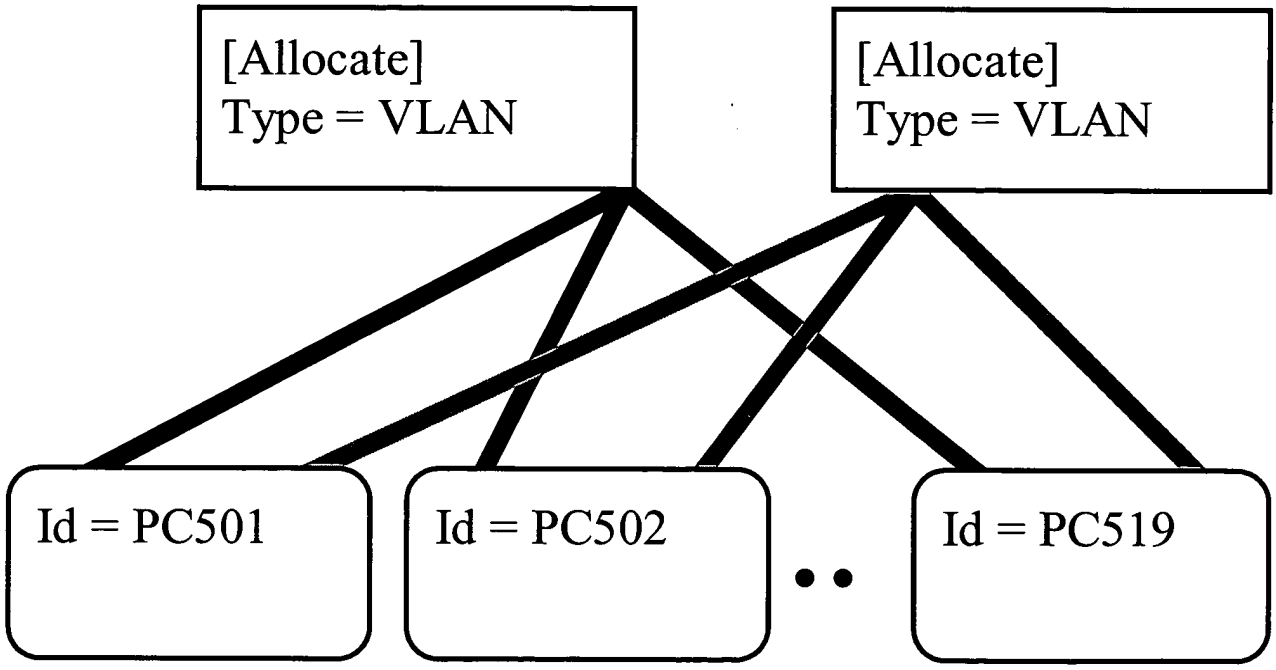

[Allocate]
Type = VLAN
[Allocate]
Type = VLAN
Id = PC501
Id = PC502
Id = PC519

Fig. 74

Fig. 75

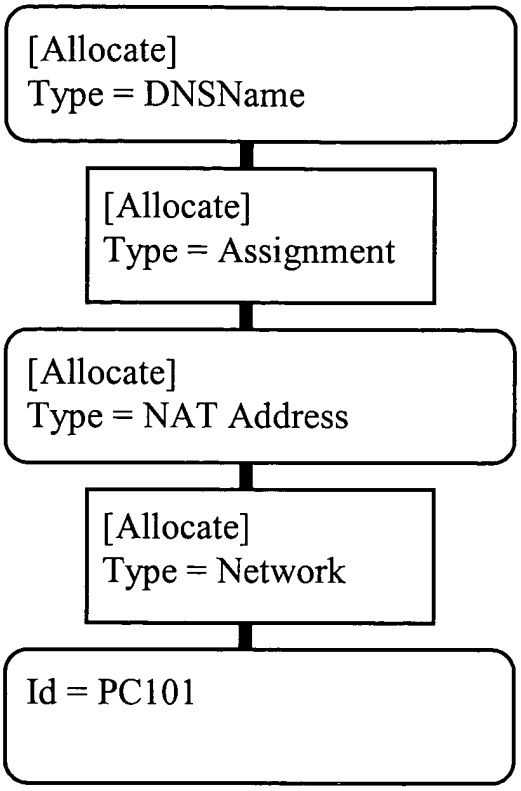
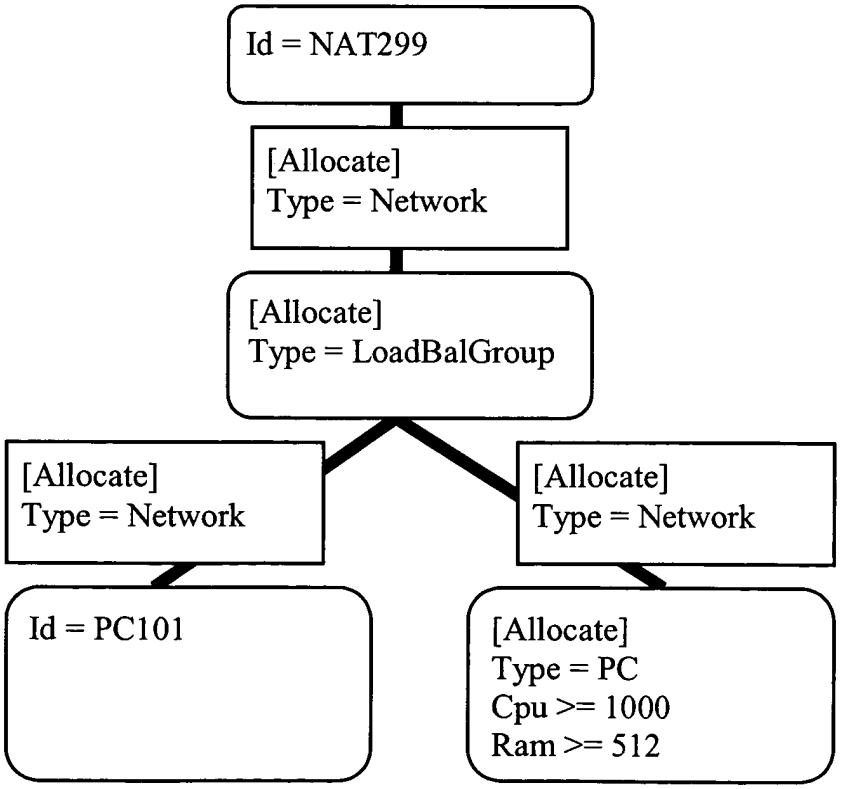

[Allocate]
Type = DNSName
[Allocate]
Type = Assignment
[Allocate]
Type = NAT Address
[Allocate]
Type = Network
Id = PC101

Fig. 76


Id = NAT299
[Allocate]
Type = Network
[Allocate]
Type = LoadBalGroup
[Allocate]
Type = Network
[Allocate]
Type = Network
Id = PC101
[Allocate]
Type = PC
Cpu >= 1000
Ram >= 512

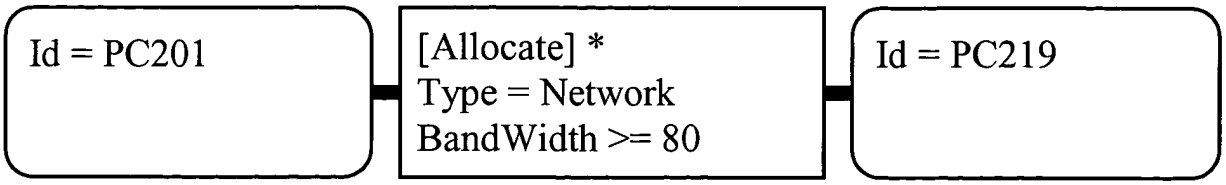


Fig. 77

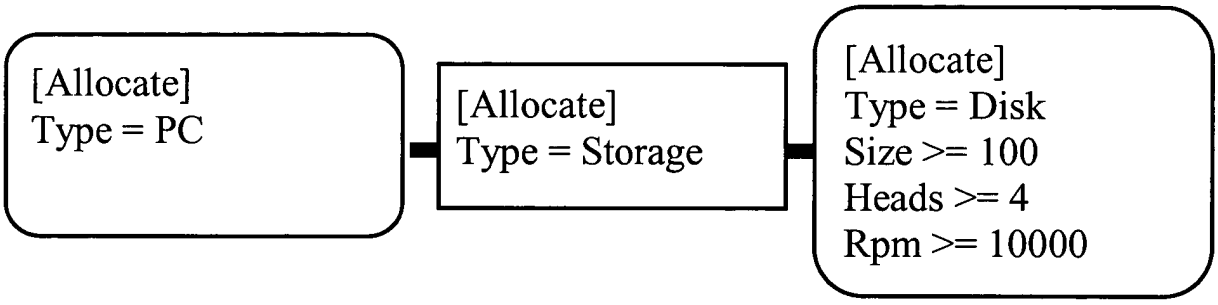


Fig. 78

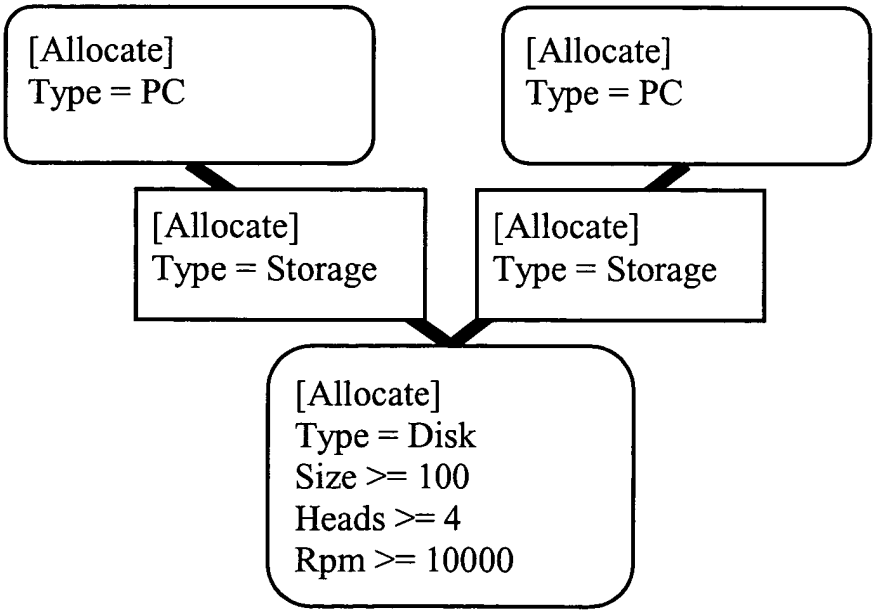


Fig. 79

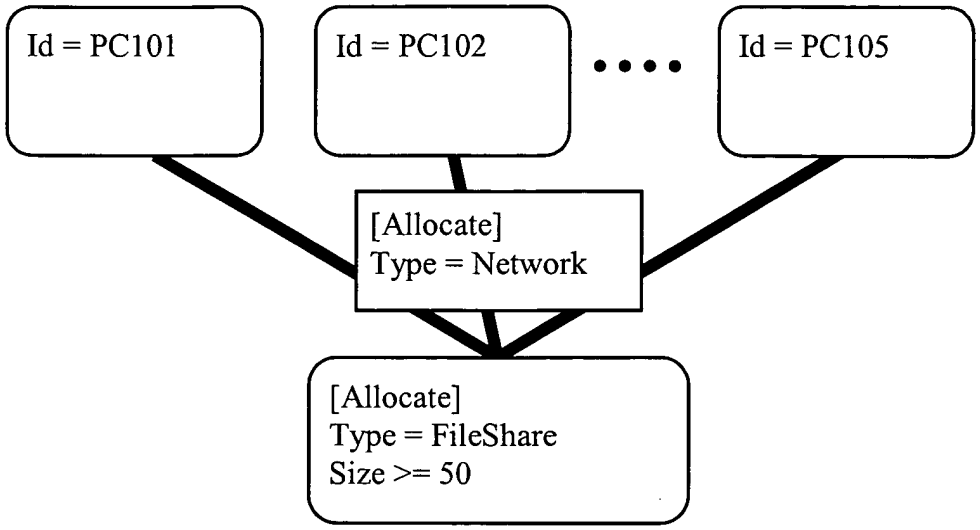

Id = PC101
Id = PC102
....
Id = PC105
[Allocate]
Type = Network
[Allocate]
Type = FileShare
Size >= 50

Fig. 80

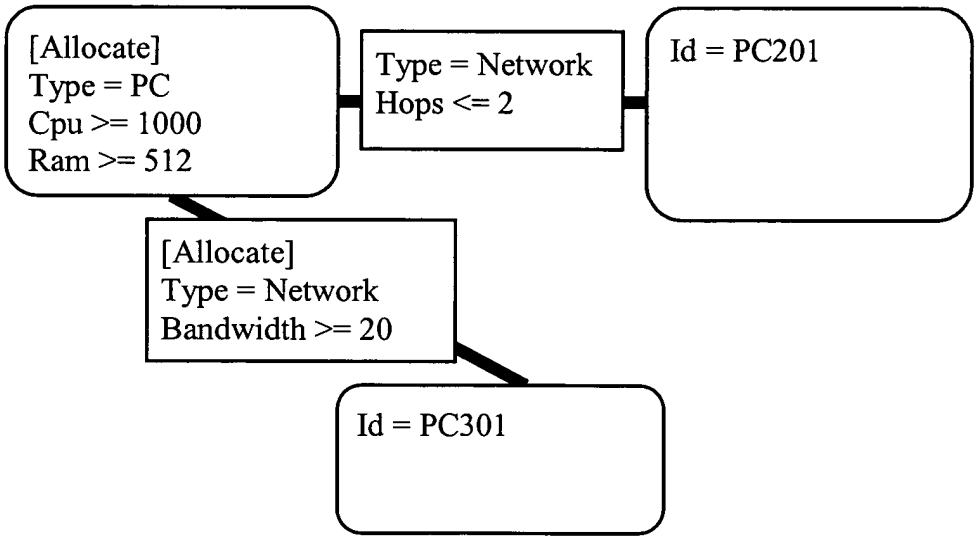

[Allocate]
Type = PC
Cpu >= 1000
Ram >= 512
Type = Network
Hops <= 2
Id = PC201
[Allocate]
Type = Network
Bandwidth >= 20
Id = PC301

Fig. 81

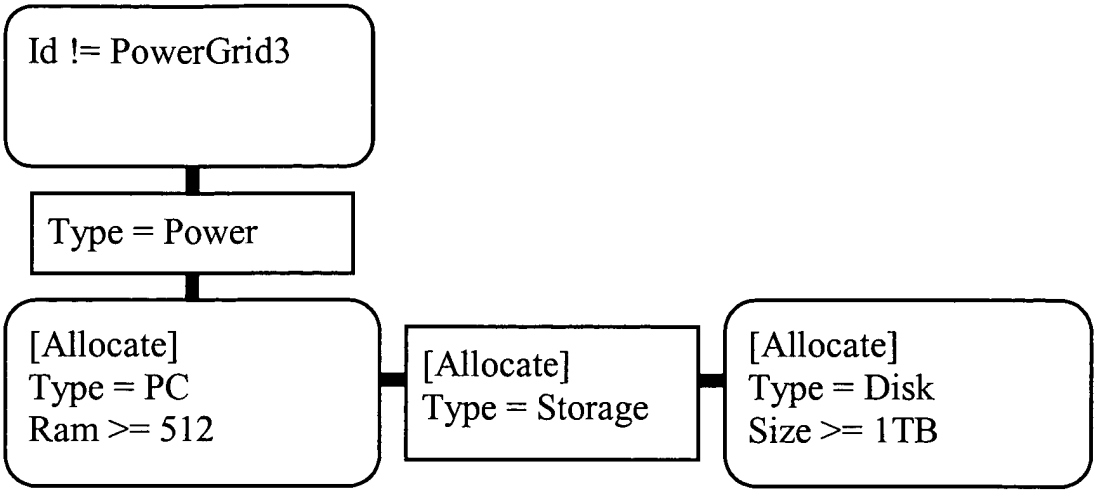

Id != PowerGrid3
Type = Power
[Allocate]
Type = PC
Ram >= 512
[Allocate]
Type = Storage
[Allocate]
Type = Disk
Size >= 1TB

Fig. 82

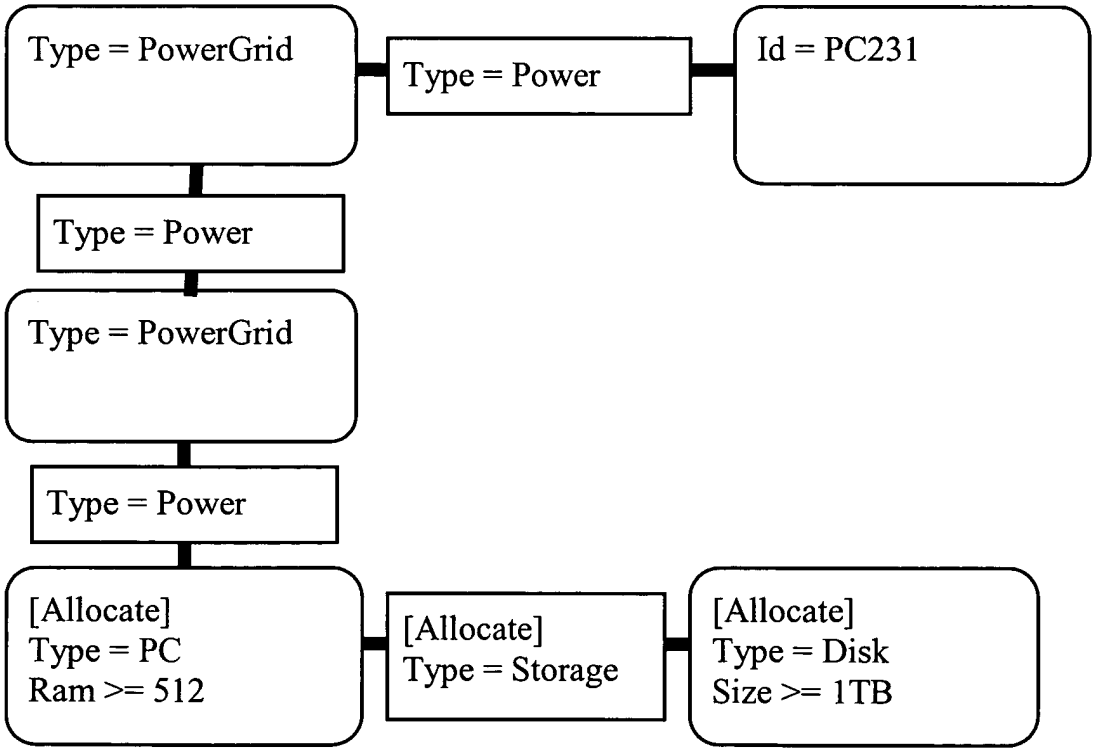

Type = PowerGrid
Type = Power
Id = PC231
Type = Power
Type = PowerGrid
Type = Power
[Allocate]
Type = PC
Ram >= 512
[Allocate]
Type = Storage
[Allocate]
Type = Disk
Size >= 1TB

Fig. 83

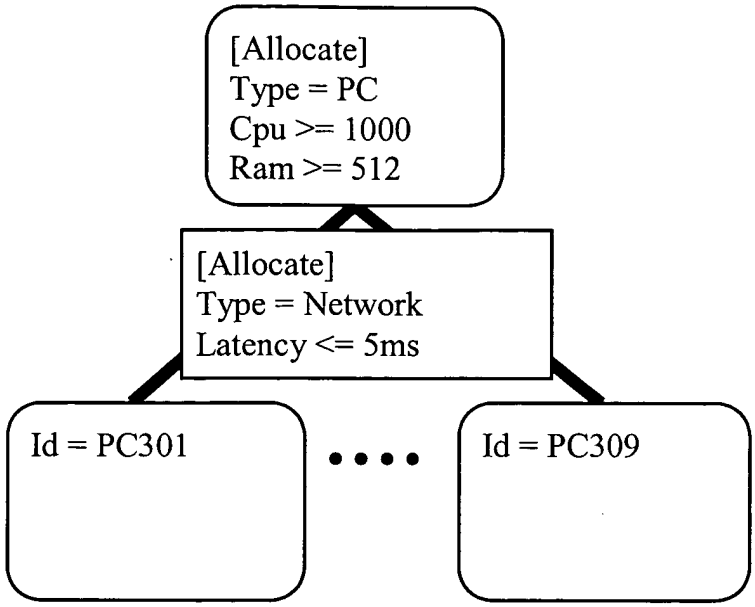

[Allocate]
Type = PC
Cpu >= 1000
Ram >= 512
[Allocate]
Type = Network
Latency <= 5ms
Id = PC301
Id = PC309

Fig. 84

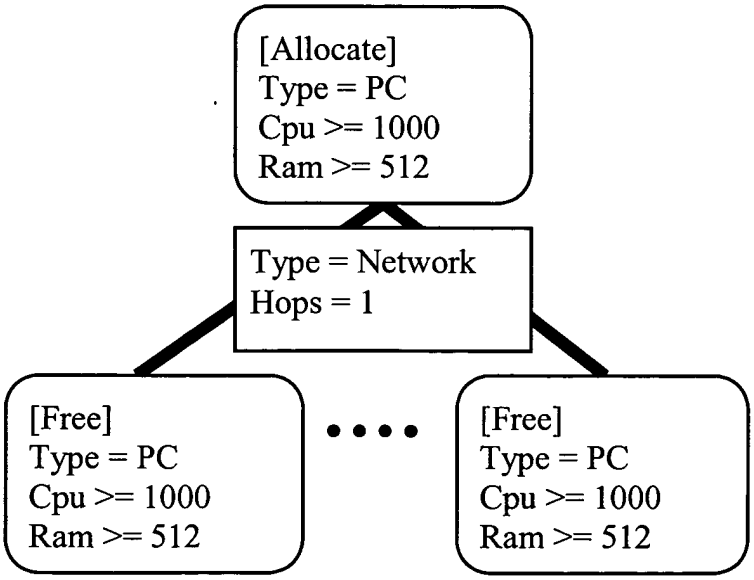

[Allocate]
Type = PC
Cpu >= 1000
Ram >= 512
Type = Network
Hops = 1
[Free]
Type = PC
Cpu >= 1000
Ram >= 512
[Free]
Type = PC
Cpu >= 1000
Ram >= 512

Fig. 85

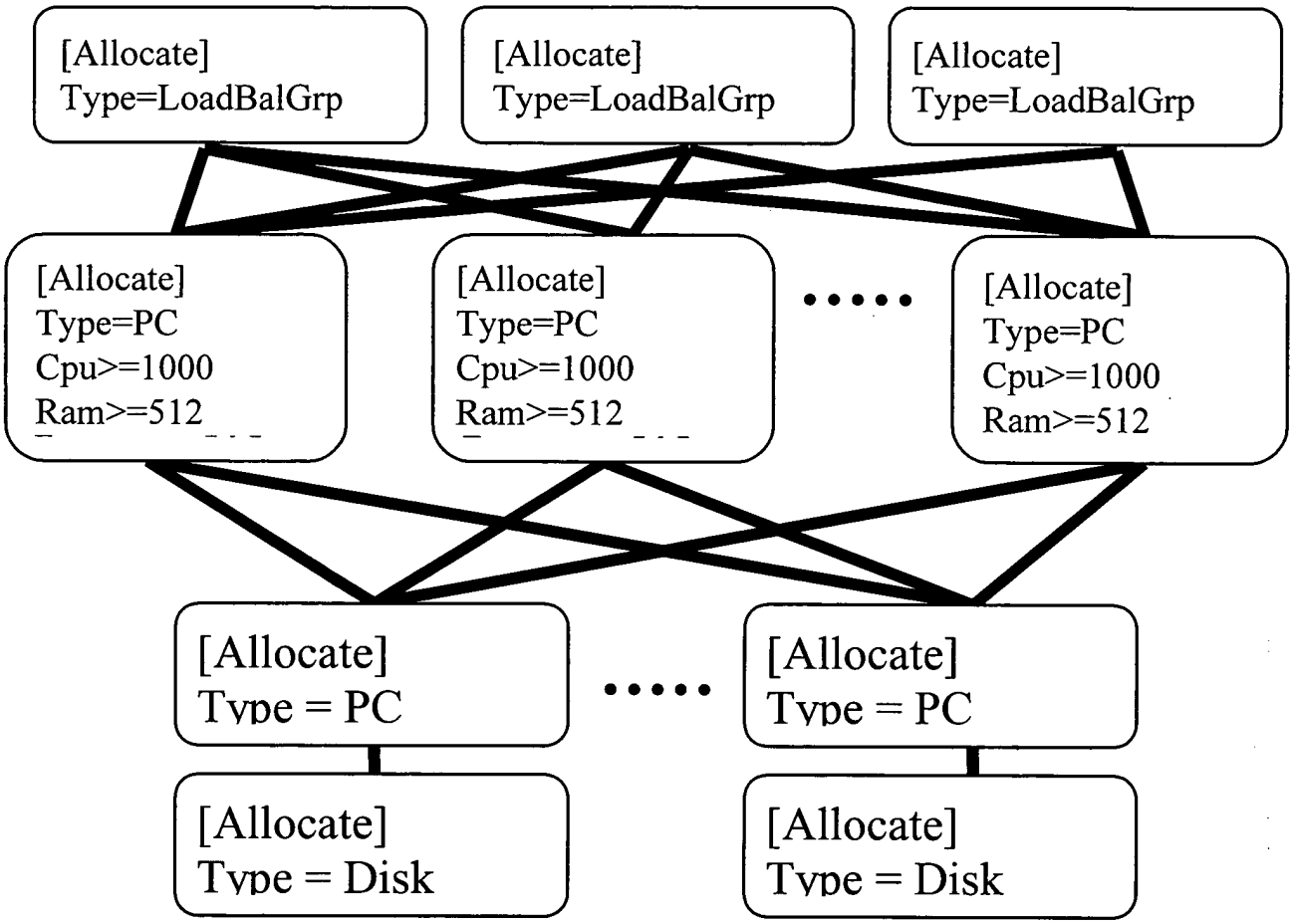

[Allocate]
Type=LoadBalGrp
[Allocate]
Type=LoadBalGrp
[Allocate]
Type=LoadBalGrp
[Allocate]
Type=PC
Cpu>=1000
Ram>=512
[Allocate]
Type=PC
Cpu>=1000
Ram>=512
[Allocate]
Type=PC
Cpu>=1000
Ram>=512
[Allocate]
Type = PC
[Allocate]
Type = PC
[Allocate]
Type = Disk
[Allocate]
Type = Disk

Fig. 86

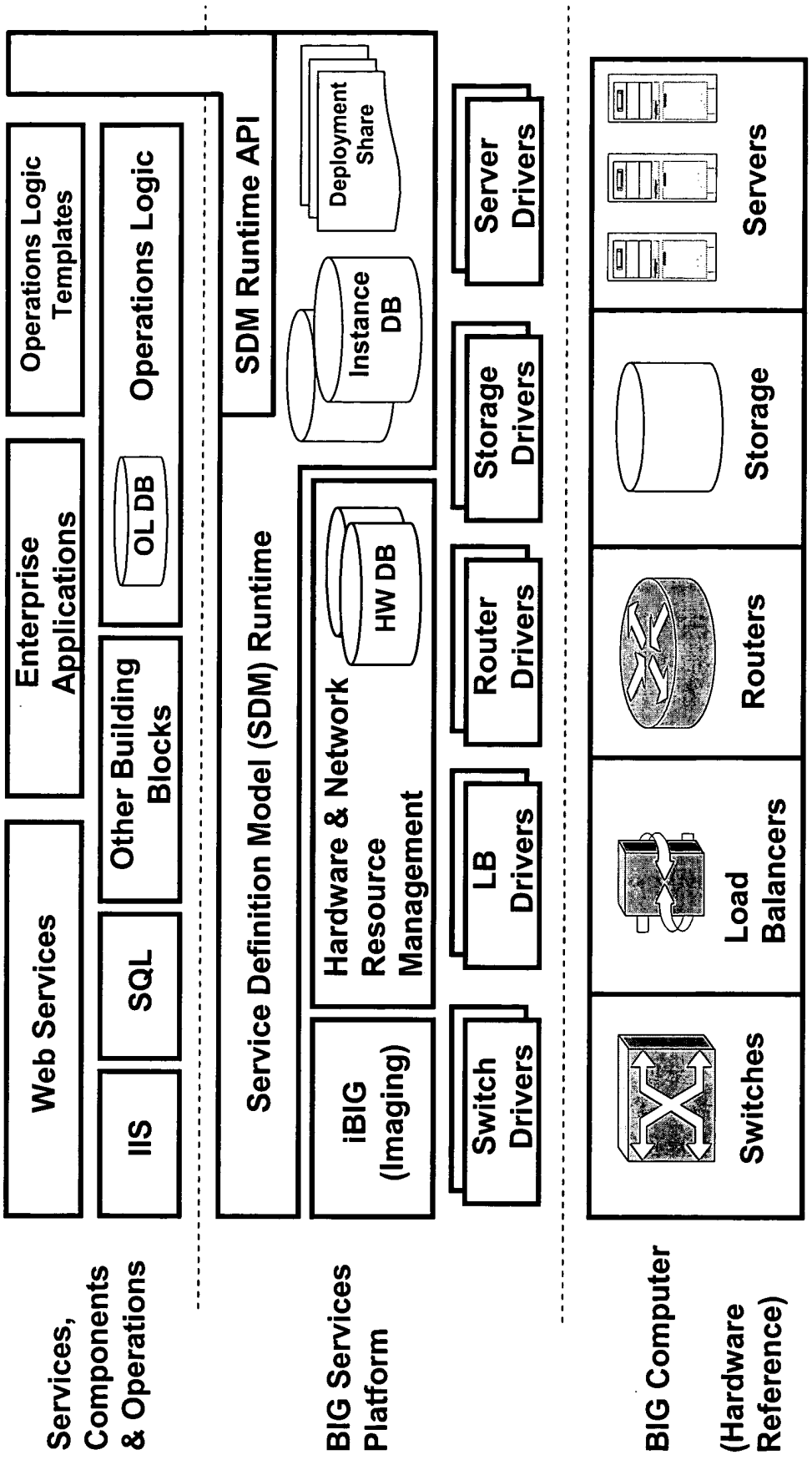

Services, Components & Operations
BIG Services Platform
BIG Computer (Hardware Reference)
Web Services
IIS
SQL
Other Building Blocks
Enterprise Applications
OL DB
Operations Logic
Operations Logic Templates
SDM Runtime API
Service Definition Model (SDM) Runtime
iBIG (Imaging)
Hardware & Network Resource Management
HW DB
Instance DB
Deployment Share
Switch Drivers
LB Drivers
Router Drivers
Storage Drivers
Server Drivers
Switches
Load Balancers
Routers
Storage
Servers

Fig. 87

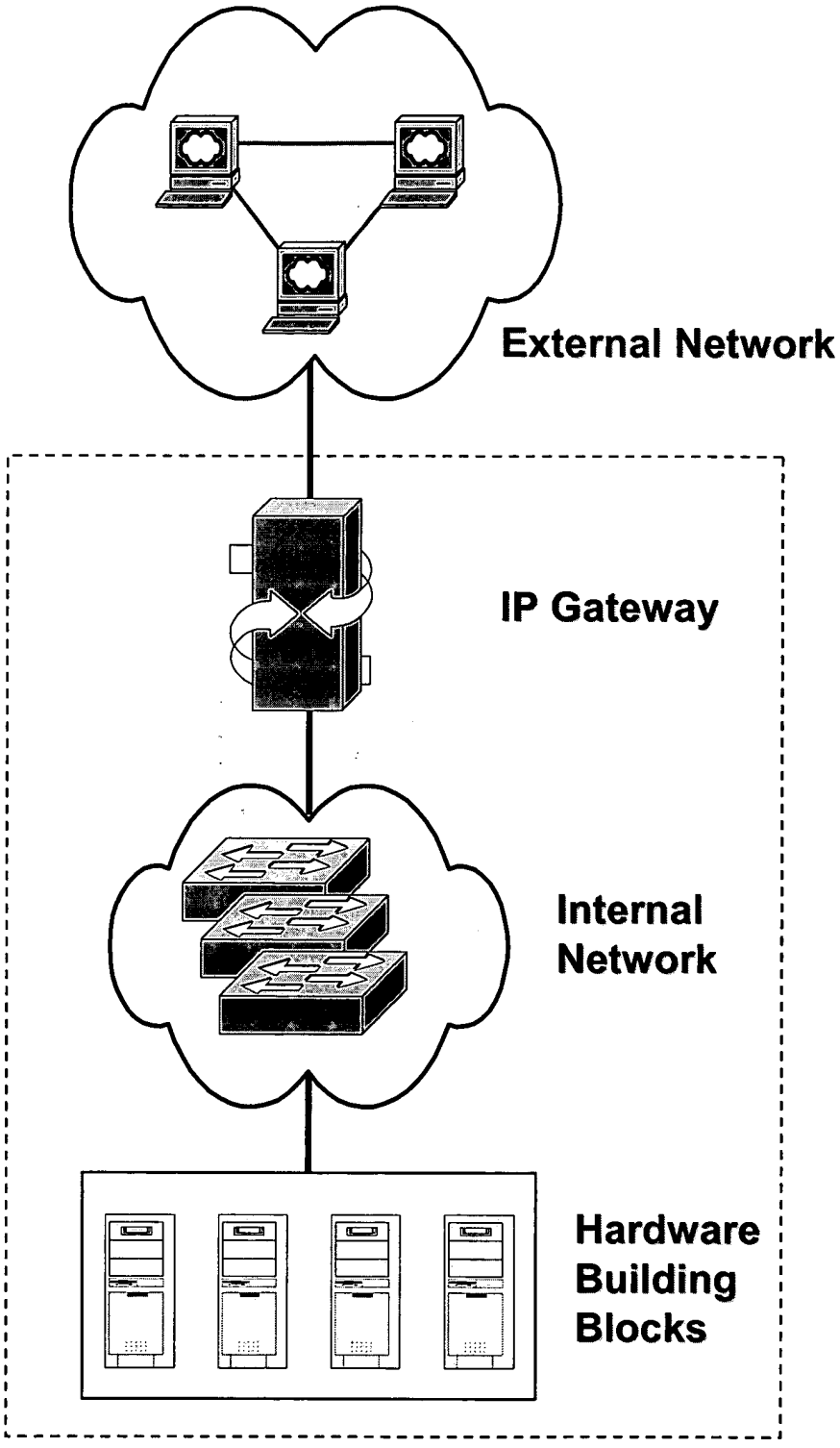
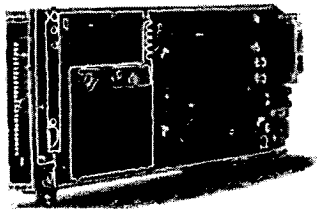
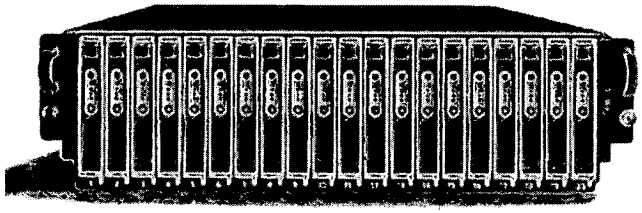

External Network
IP Gateway
Internal Network
Hardware Building Blocks

Fig. 88

BL10e

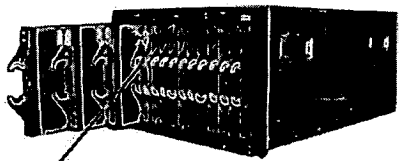


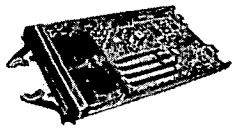


3U enclosure (20 blades)

HPQ Proliant BL e-class

- Pentium III 700MHz
- 512MB – 1GB ECC RAM
- 30GB ATA Hard Disk
- Dual 10/100 Fast Ethernet
- Layer 2 switch, (4) Gigabit uplinks
- Redundant 600 W power supplies
- 280 blades per 42U rack, 25W per slot





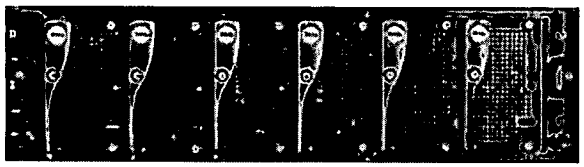
7U enclosure (14 blades)

IBM BladeCenter

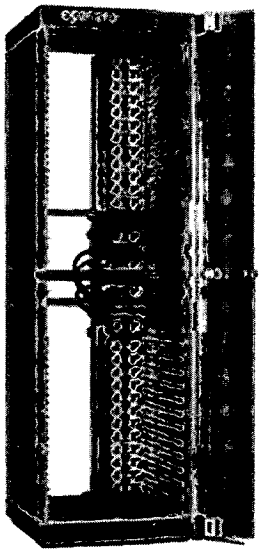
- Dual Xeon
- 8GB ECC RAM
- iSCSI or Fibre Channel storage
- (4) Gigabit Ethernet
- (4) 1200 W power supplies
- 98 blades per 42U rack

Dell PowerEdge 1655MC

- Dual Pentium III 1.2GHz
- 128MB – 2GB ECC RAM
- 36-146GB SCSI Hard Disk
- Dual Gigabit Ethernet
- (2) Layer 2 switches, (4) Gigabit uplinks
- Redundant 1040 W power supplies
- 84 blades per 42U rack

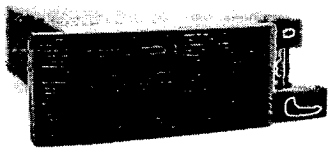


3U enclosure (6 blades)

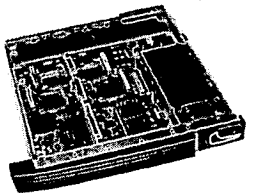


egenera BladeFrame

- 2 or 4-way Xeon 1.4GHz
- 12GB ECC RAM
- Redundant 10/100, 1 Gb or Fibre Channel
- Redundant power supplies
- Hot pluggable blades
- 24 processing blades per rack



Control Blade



Processing Blade

Fig. 89

MS1-1494US

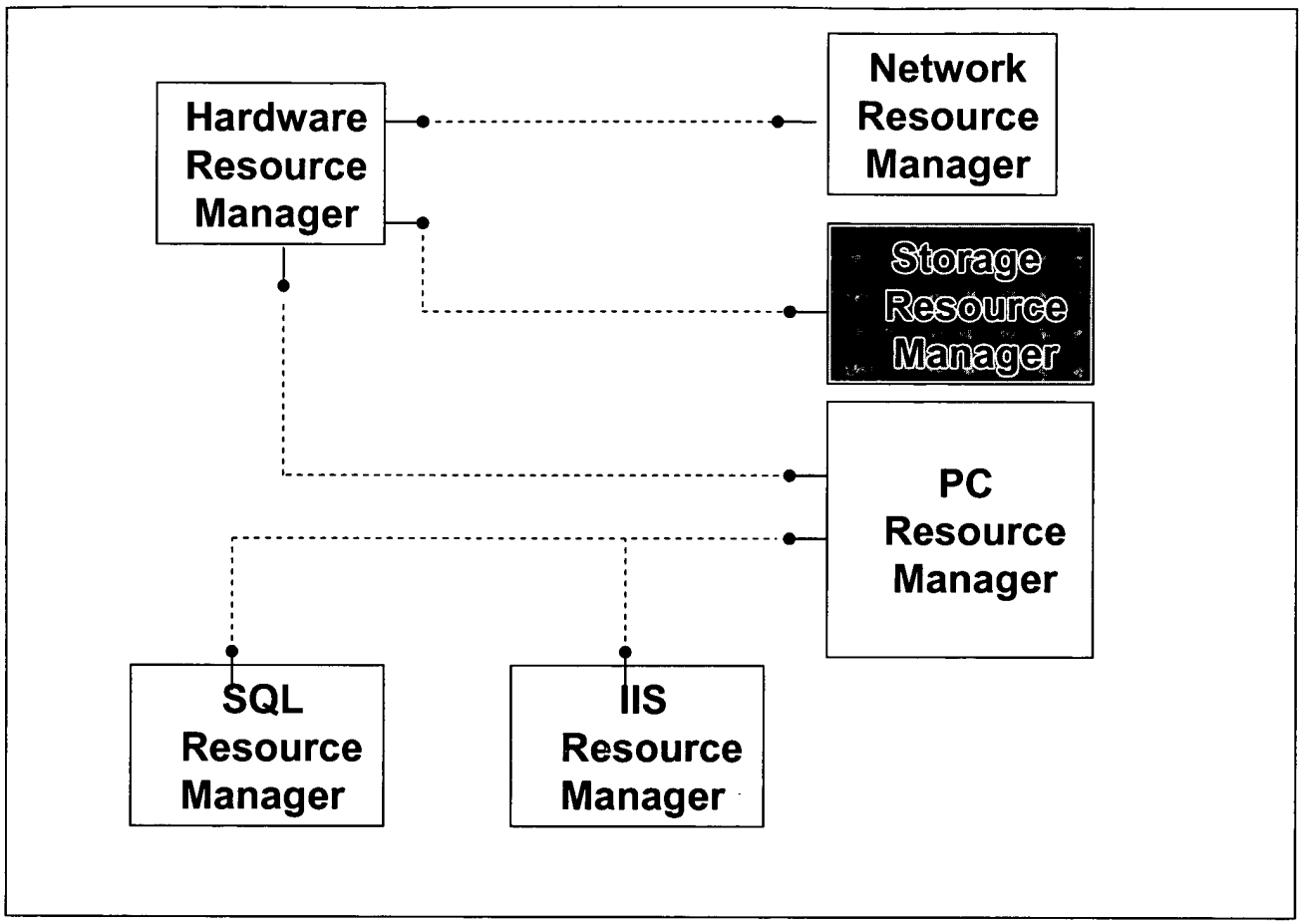

Hardware Resource Manager
Network Resource Manager
Storage Resource Manager
PC Resource Manager
SQL Resource Manager
IIS Resource Manager

Fig. 90

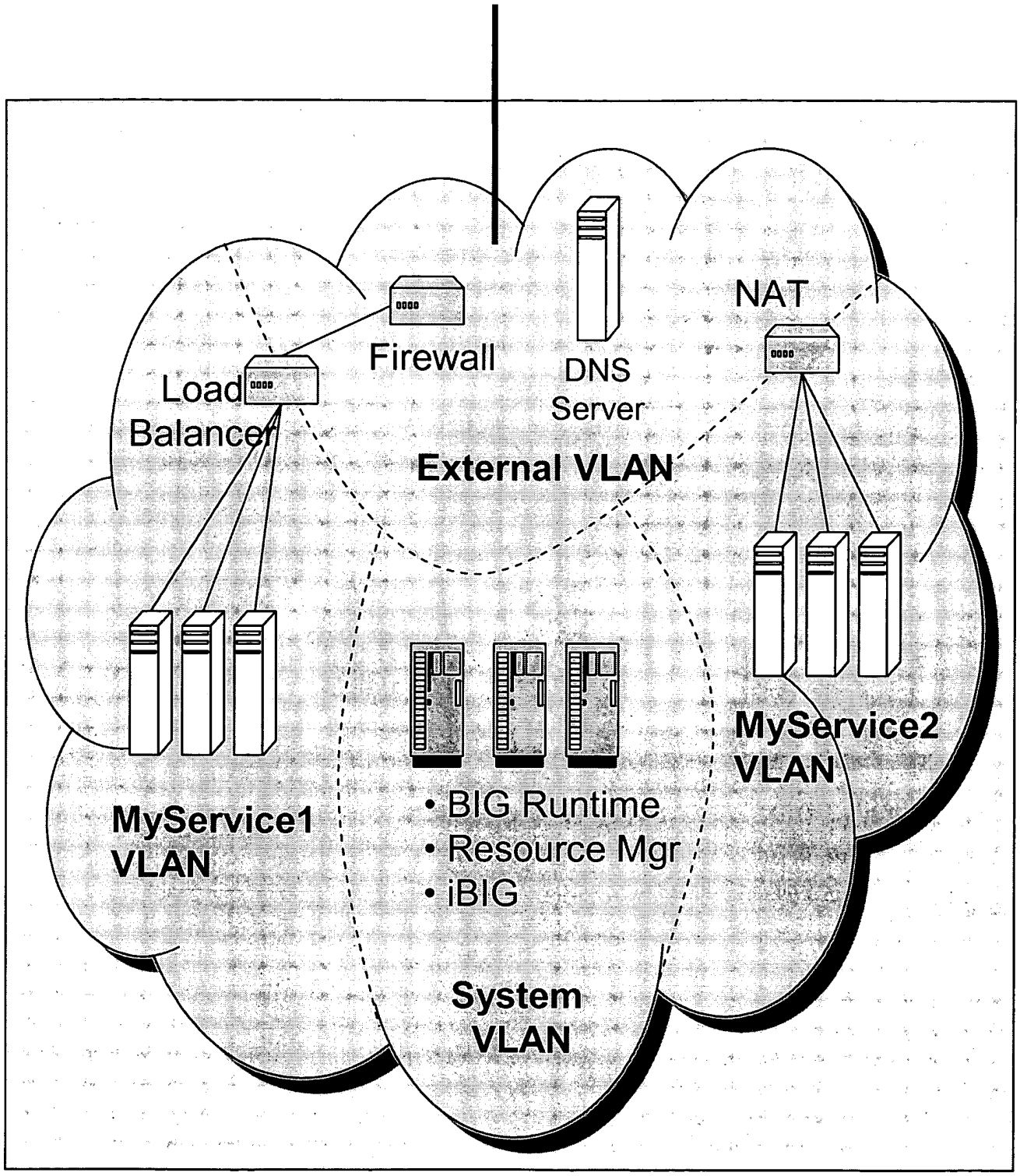

Firewall
DNS
Server
NAT
Load
Balancer
External VLAN
MyService2
VLAN
MyService1
VLAN
• BIG Runtime
• Resource Mgr
• iBIG
System
VLAN

Fig. 91

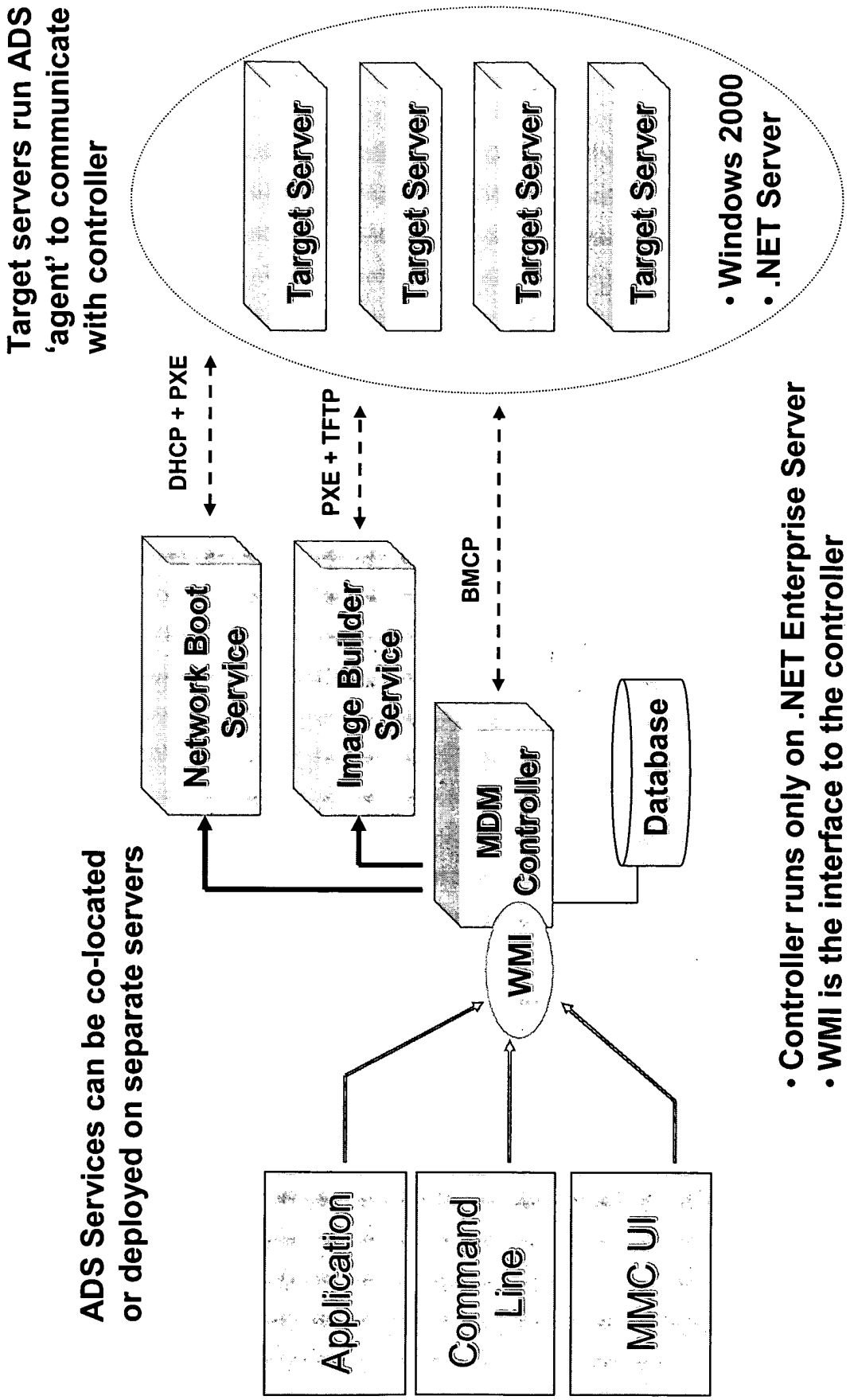

Target servers run ADS 'agent' to communicate with controller
Target Server
Target Server
Target Server
Target Server
• Windows 2000
• .NET Server
DHCP + PXE
PXE + TFTP
BMCP
Network Boot Service
Image Builder Service
MDM Controller
Database
WMI
Application
Command Line
MMC UI
ADS Services can be co-located or deployed on separate servers
• Controller runs only on .NET Enterprise Server
• WMI is the interface to the controller

Fig. 92

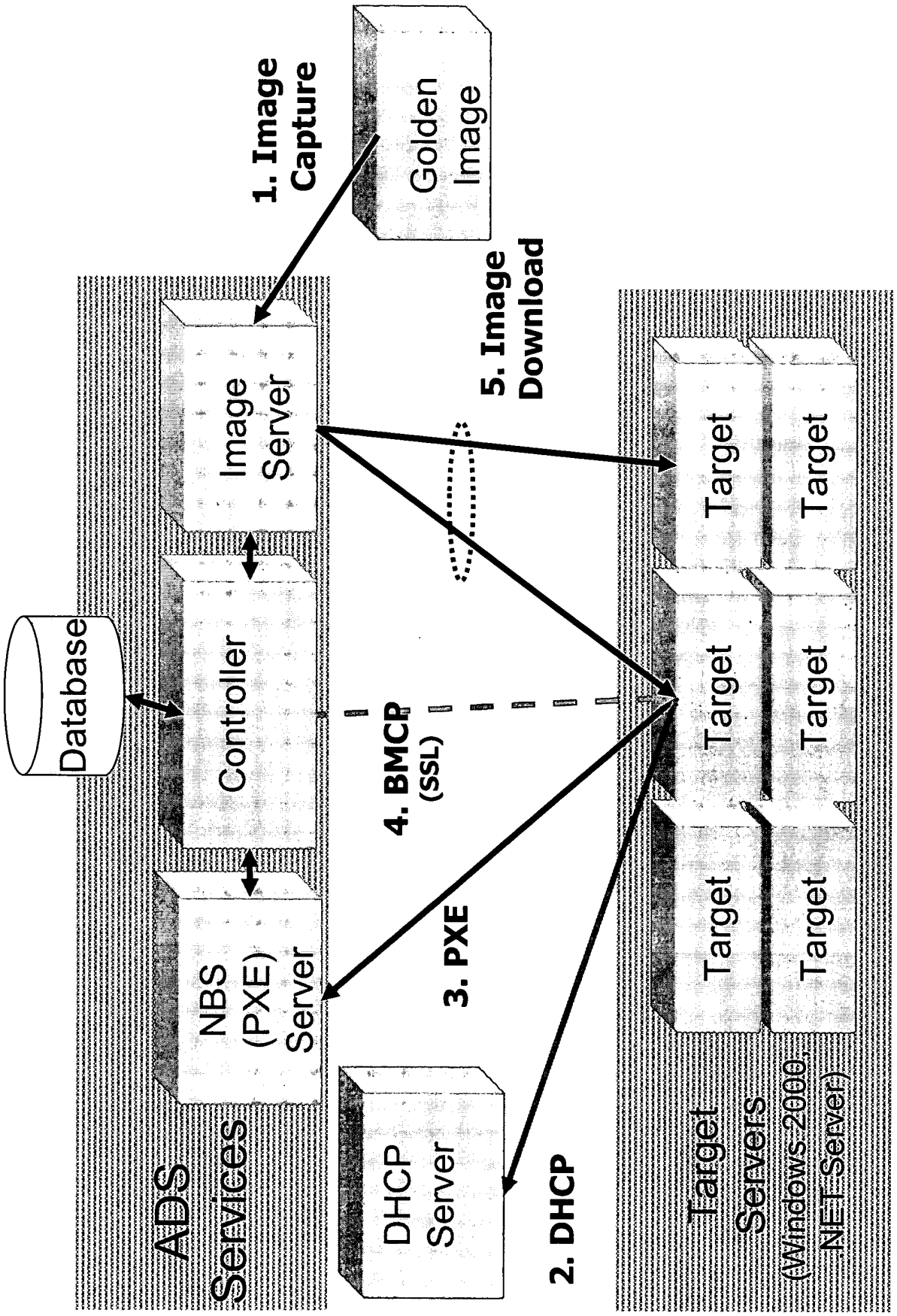

1. Image Capture
Golden Image
5. Image Download
Image Server
Database
Controller
NBS (PXE) Server
4. BMCP (SSL)
3. PXE
DHCP Server
2. DHCP
ADS Services
Target
Target
Target
Target
Target
Target
Target Servers (Windows 2000 .NET Server)

Fig. 93

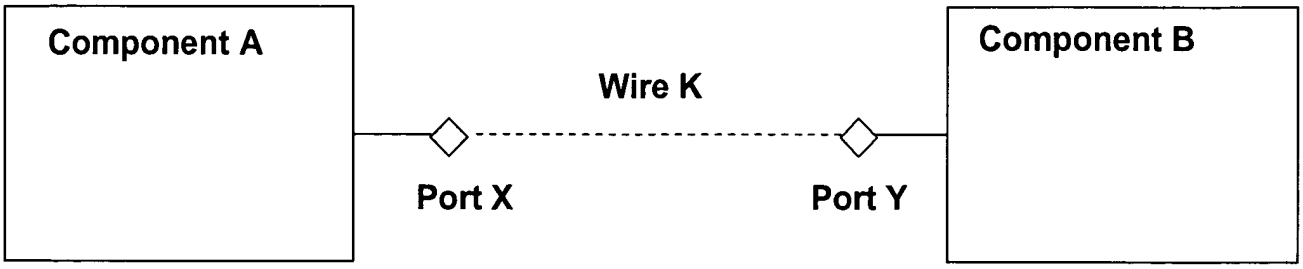


Fig. 94

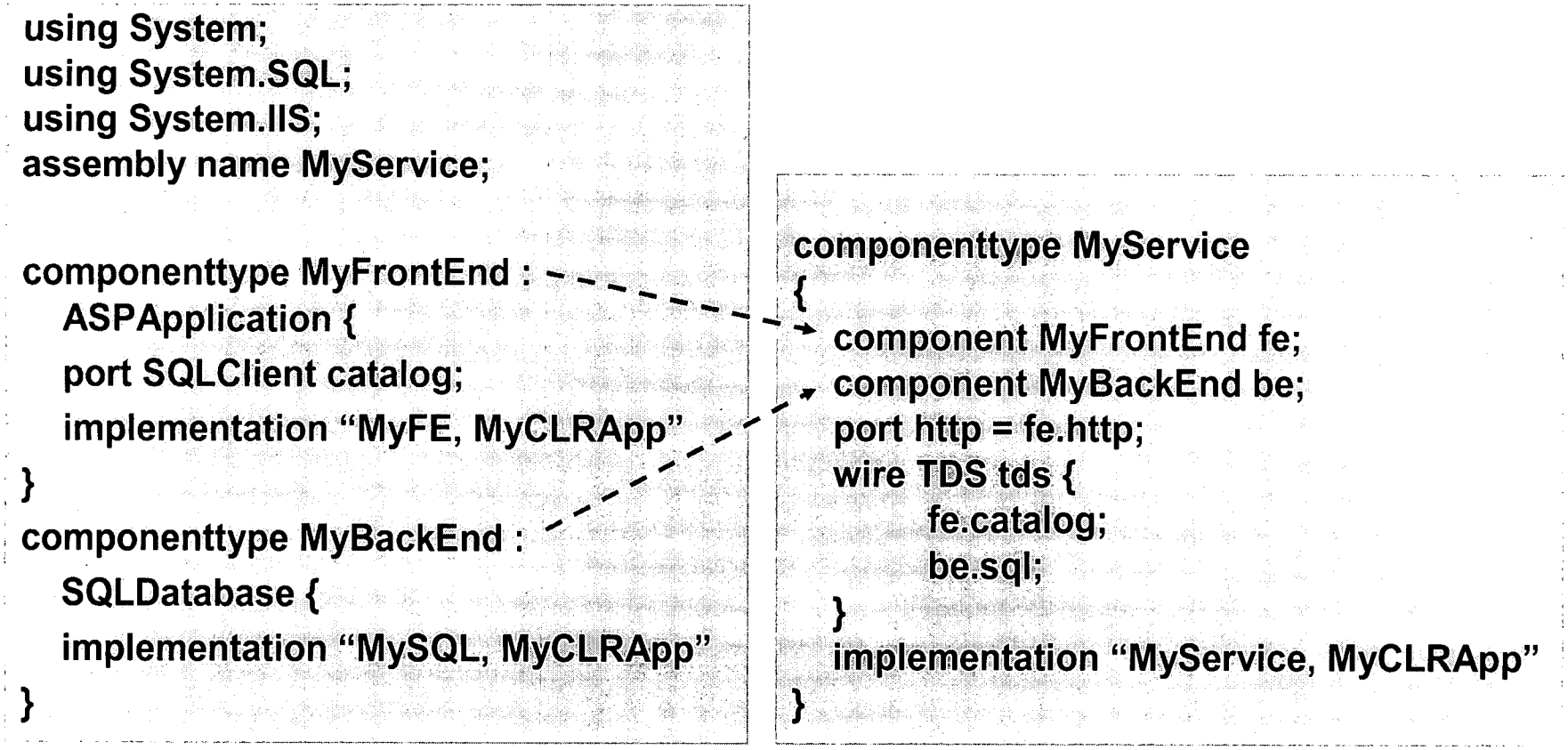

using System;
using System.SQL;
using System.IIS;
assembly name MyService;
componenttype MyFrontEnd :
ASPApplication {
port SQLClient catalog;
implementation "MyFE, MyCLRApp"
}
componenttype MyBackEnd :
SQLDatabase {
implementation "MySQL, MyCLRApp"
}
componenttype MyService
{
component MyFrontEnd fe;
component MyBackEnd be;
port http = fe.http;
wire TDS tds {
fe.catalog;
be.sql;
}
implementation "MyService, MyCLRApp"
}

Fig. 95

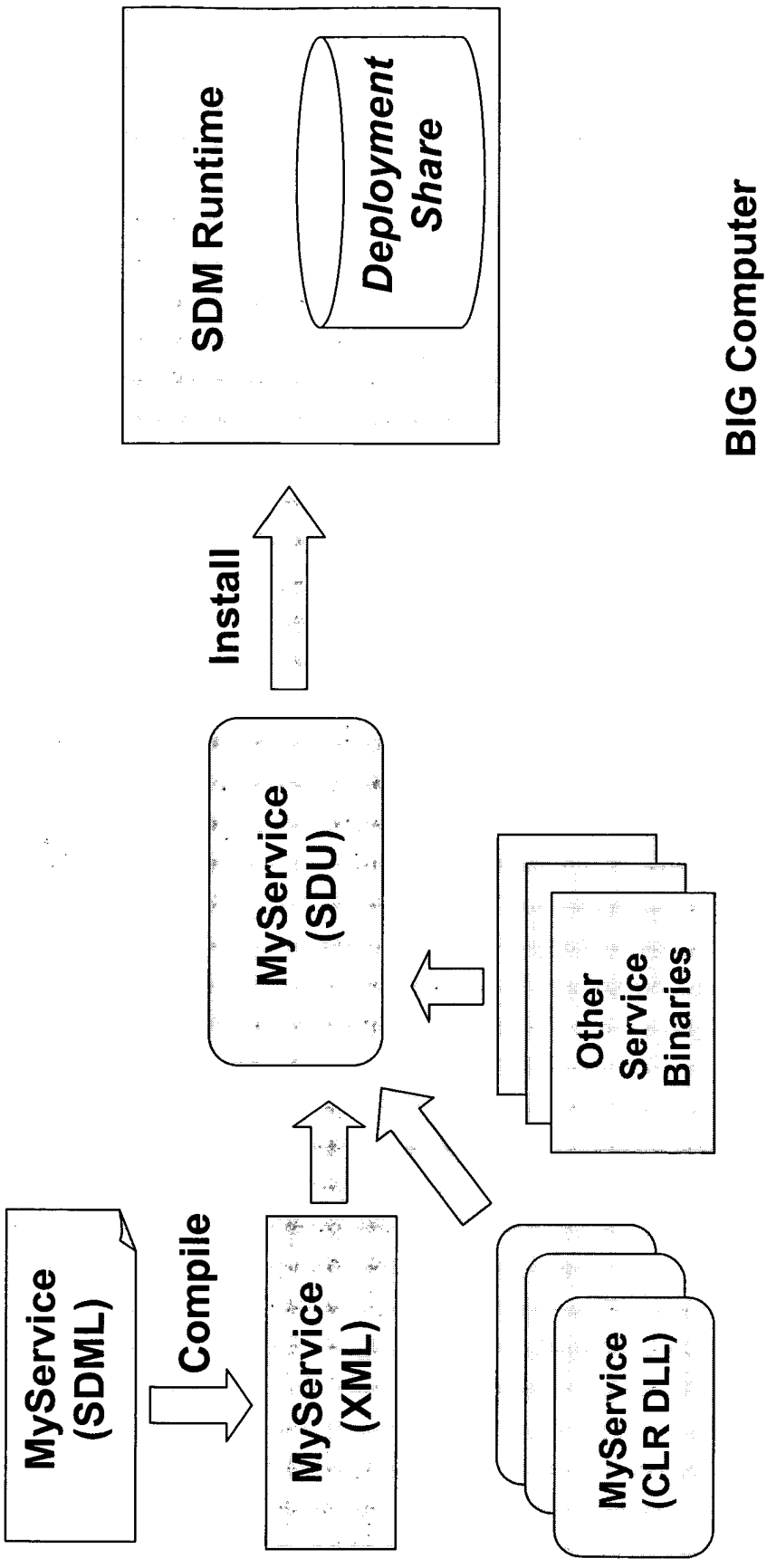

MyService (SDML)
Compile
MyService (XML)
MyService (CLR DLL)
Other Service Binaries
MyService (SDU)
Install
SDM Runtime
Deployment Share
BIG Computer

Fig. 96

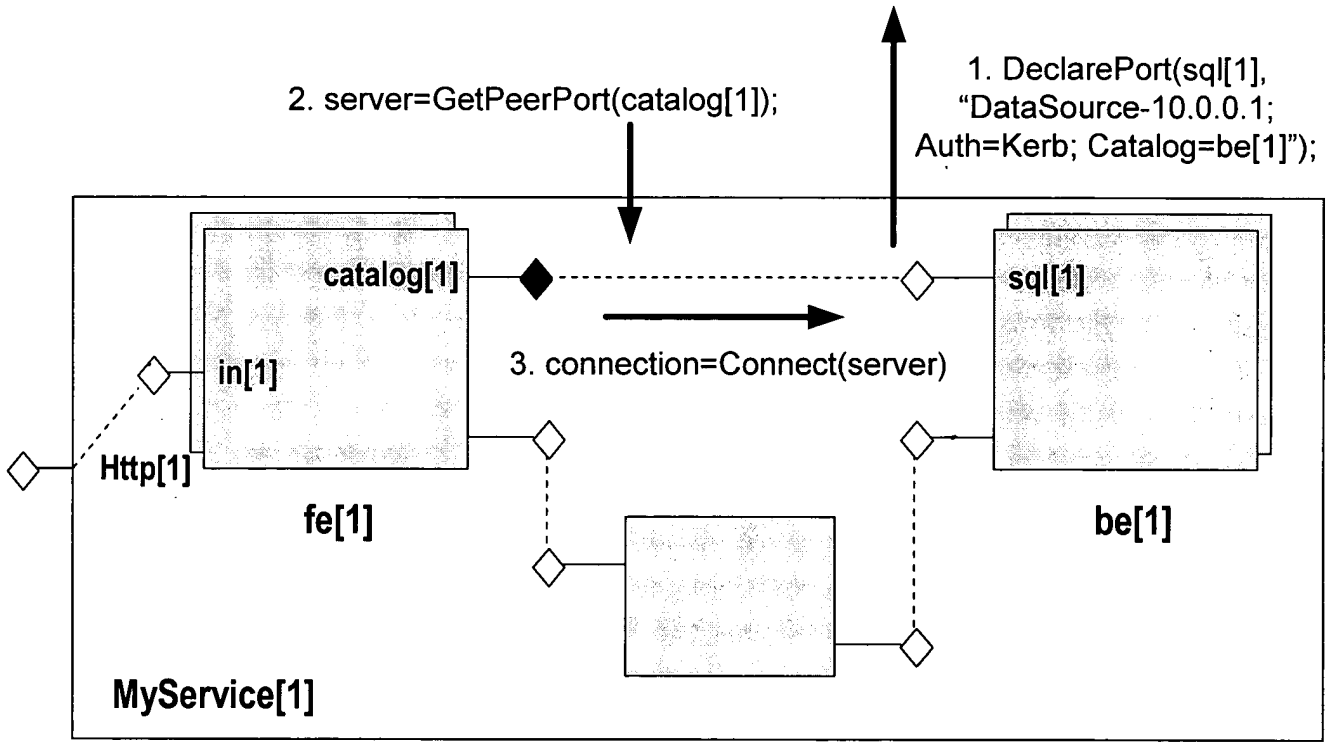

2. server=GetPeerPort(catalog[1]);
1. DeclarePort(sql[1],
"DataSource-10.0.0.1;
Auth=Kerb; Catalog=be[1]");
catalog[1]
sql[1]
in[1]
3. connection=Connect(server)
Http[1]
fe[1]
be[1]
MyService[1]

Fig. 97

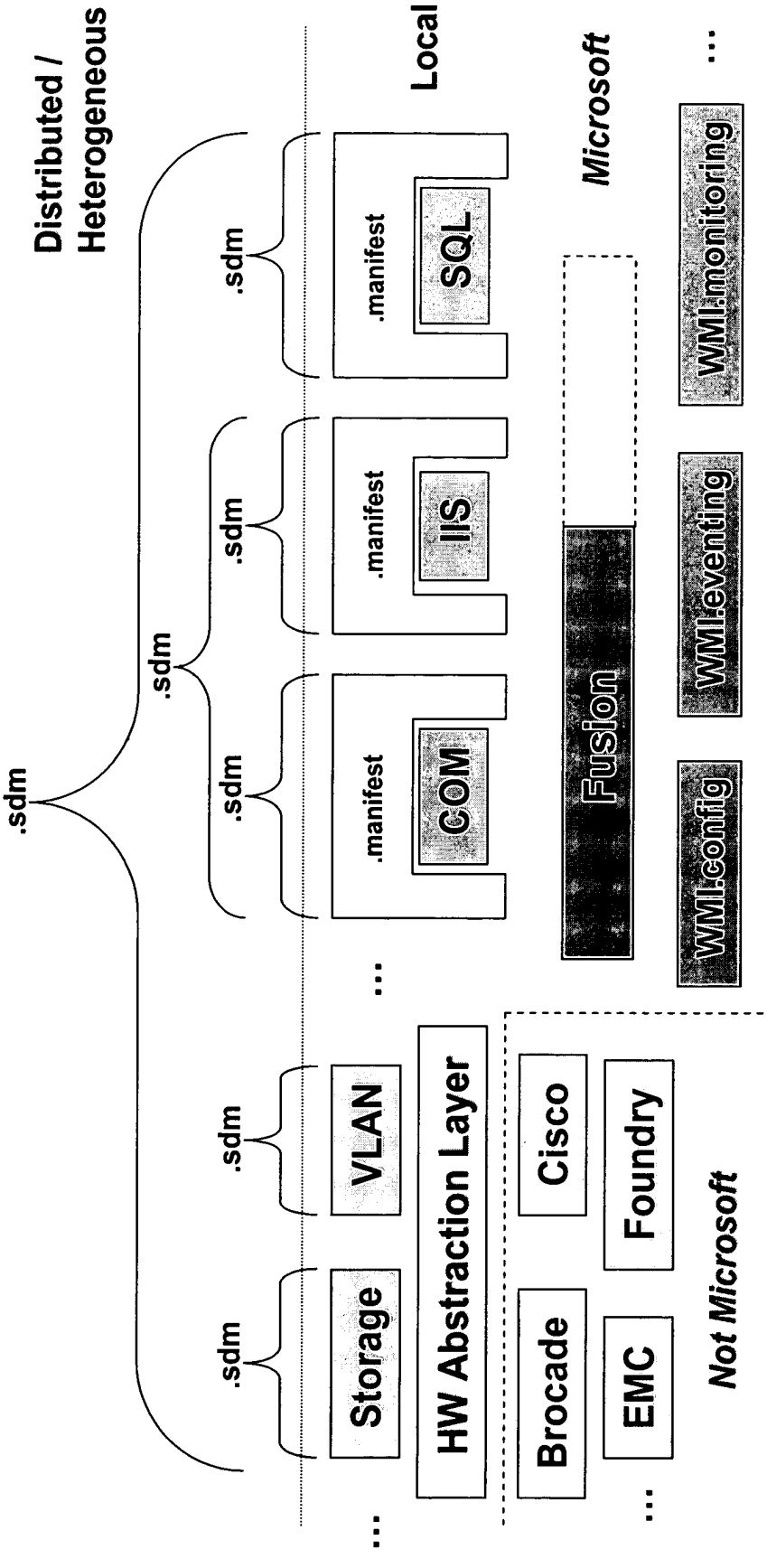

Distributed / Heterogeneous
.sdm
.sdm
.sdm
.sdm
.sdm
.sdm
.sdm
.sdm
.sdm
Storage
VLAN
HW Abstraction Layer
Brocade
Cisco
EMC
Foundry
Not Microsoft
...
...
.manifest
COM
.manifest
IIS
.manifest
SQL
Local
Fusion
Microsoft
WMI.config
WMI.eventing
WMI.monitoring
...

Fig. 98

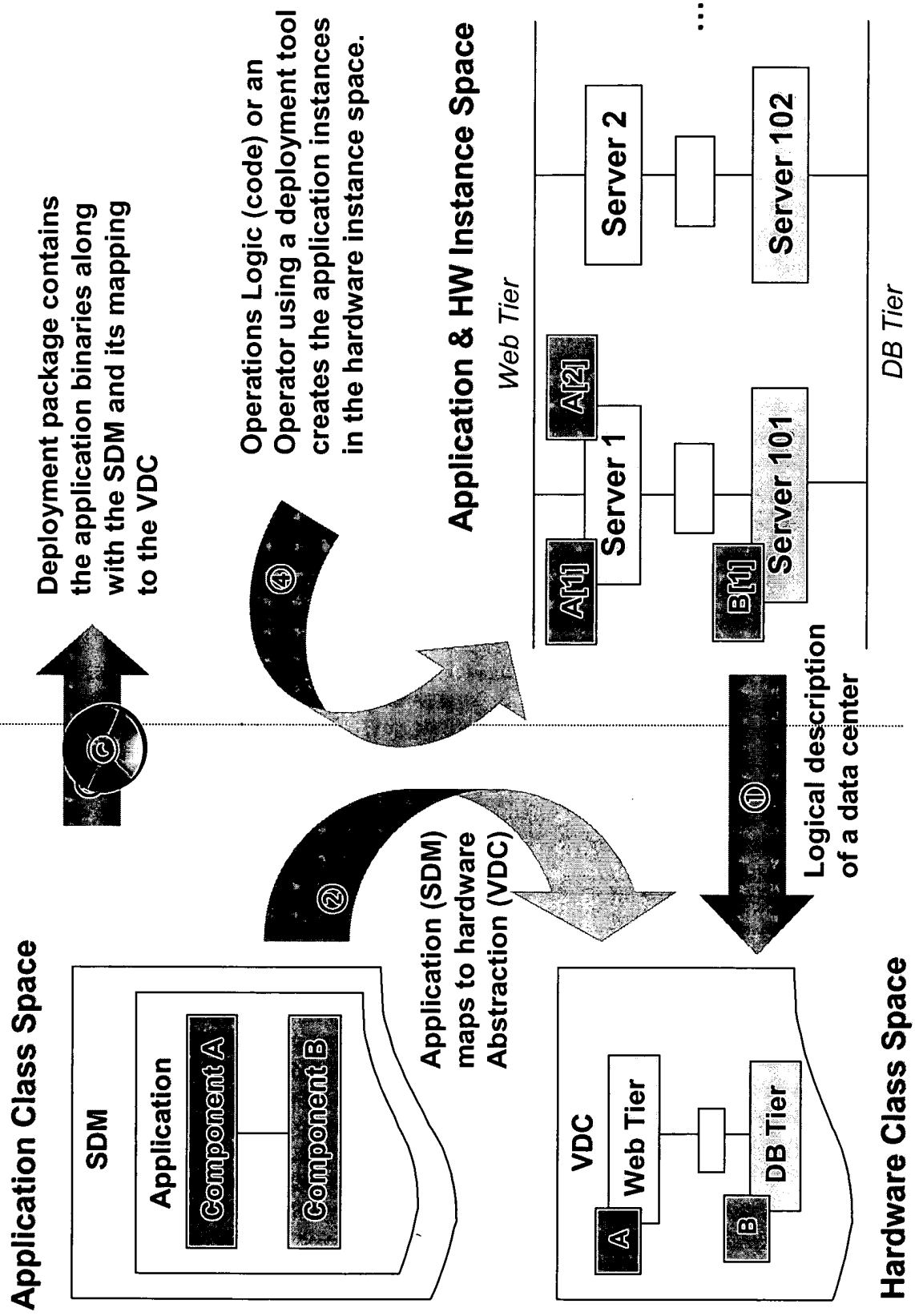

Application Class Space
SDM
Application
Component A
Component B
Application (SDM) maps to hardware Abstraction (VDC)
Logical description of a data center
Deployment package contains the application binaries along with the SDM and its mapping to the VDC
Operations Logic (code) or an Operator using a deployment tool creates the application instances in the hardware instance space.
Application & HW Instance Space
Web Tier
DB Tier
A[1]
A[2]
B[1]
Server 1
Server 2
Server 101
Server 102
VDC
A
Web Tier
B
DB Tier
Hardware Class Space

Fig. 99

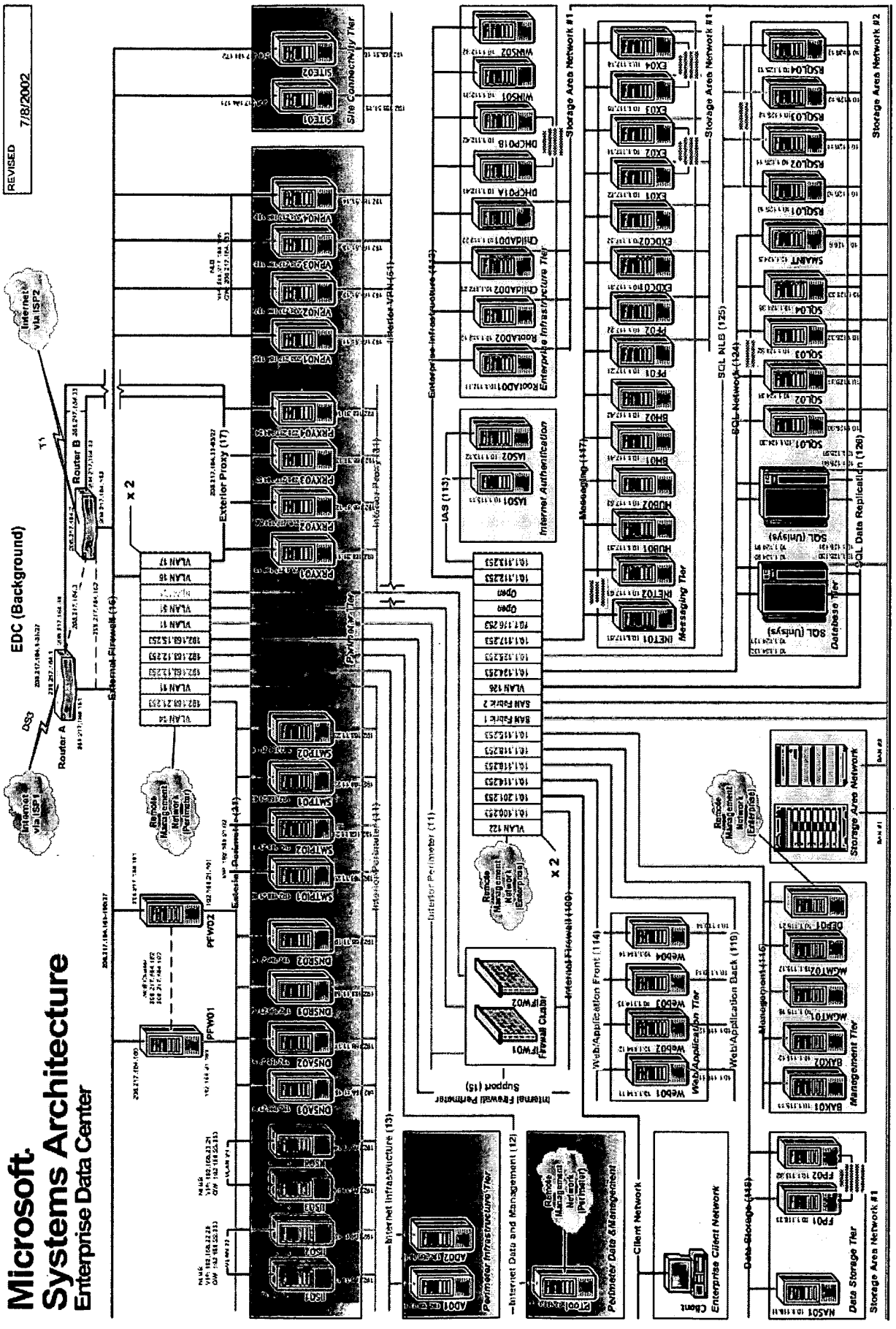

Microsoft
Systems Architecture
Enterprise Data Center
REVISED 7/8/2002
EDC (Background)
Internet via ISP1
Internet via ISP2
Router A
Router B
DS3
T1
External Firewall (16)
Interior VPN (151)
Exterior Proxy (17)
x 2
Perimeter Tier
Site Connectivity Tier
Enterprise Infrastructure Tier
Internet Authentication
Messaging (147)
Messaging Tier
Storage Area Network #1
SQL NLB (125)
SQL Network (124)
Database Tier
SQL Data Replication (126)
Storage Area Network #2
Interior Perimeter (11)
Internal Firewall Perimeter Support (15)
Firewall Cluster
Internal Firewall (140)
Web/Application Front (114)
Web/Application Back (116)
Management (146)
Management Tier
Perimeter Infrastructure Tier
Internet Data and Management (12)
Perimeter Data & Management
Client Network
Enterprise Client Network
Data Storage (145)
Data Storage Tier
Storage Area Network #1
Remote Management Network (Perimeter)
Remote Management Network (Enterprise)

Fig. 100

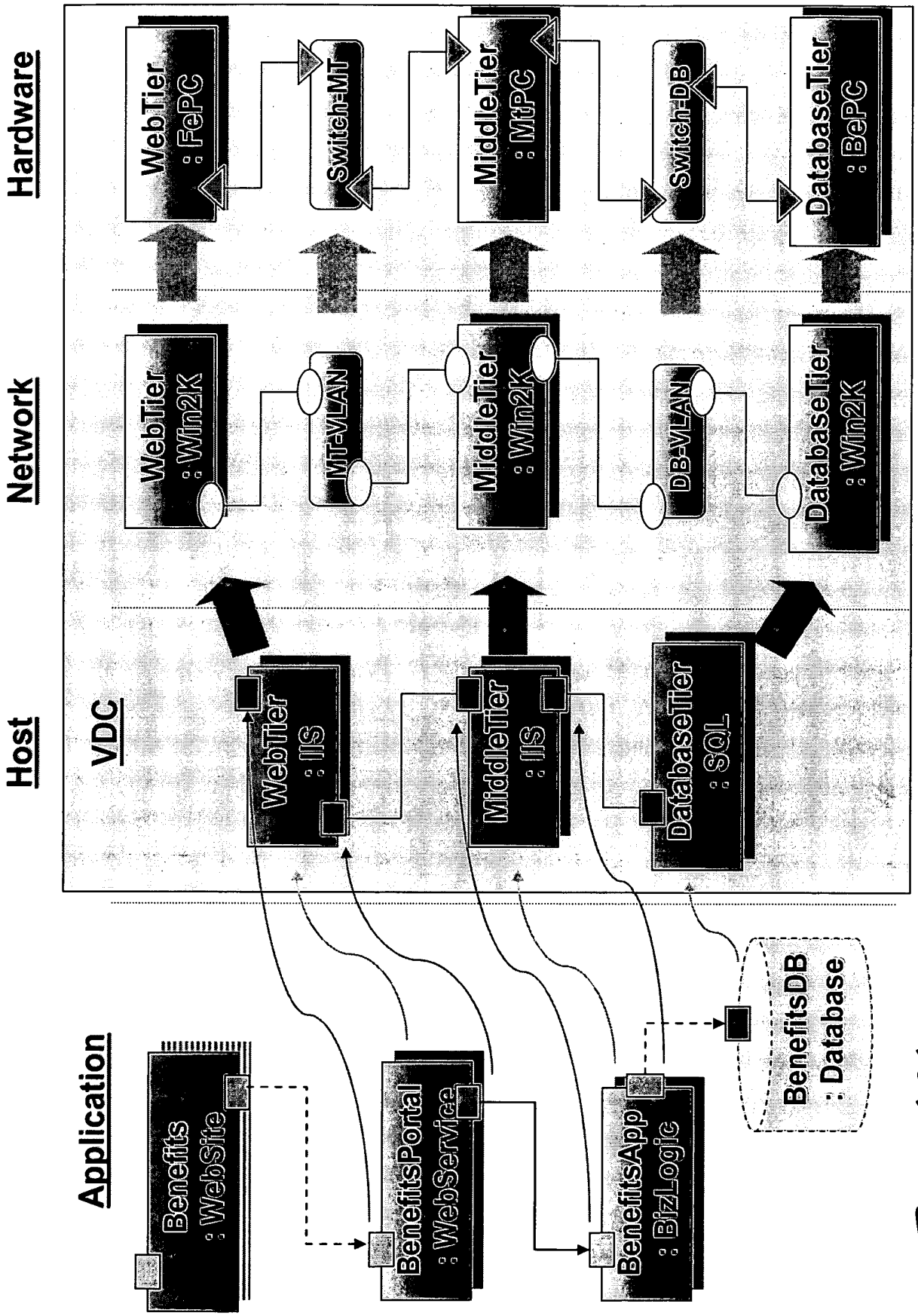

Application
Host
Network
Hardware
VDC
Benefits : WebSite
BenefitsPortal : WebService
BenefitsApp : BizLogic
BenefitsDB : Database
WebTier : IIS
MiddleTier : IIS
DatabaseTier : SQL
WebTier : Win2K
MT-VLAN
MiddleTier : Win2K
DB-VLAN
DatabaseTier : Win2K
WebTier : FePC
Switch-MT
MiddleTier : MtPC
Switch-DB
DatabaseTier : BePC

Fig. 101

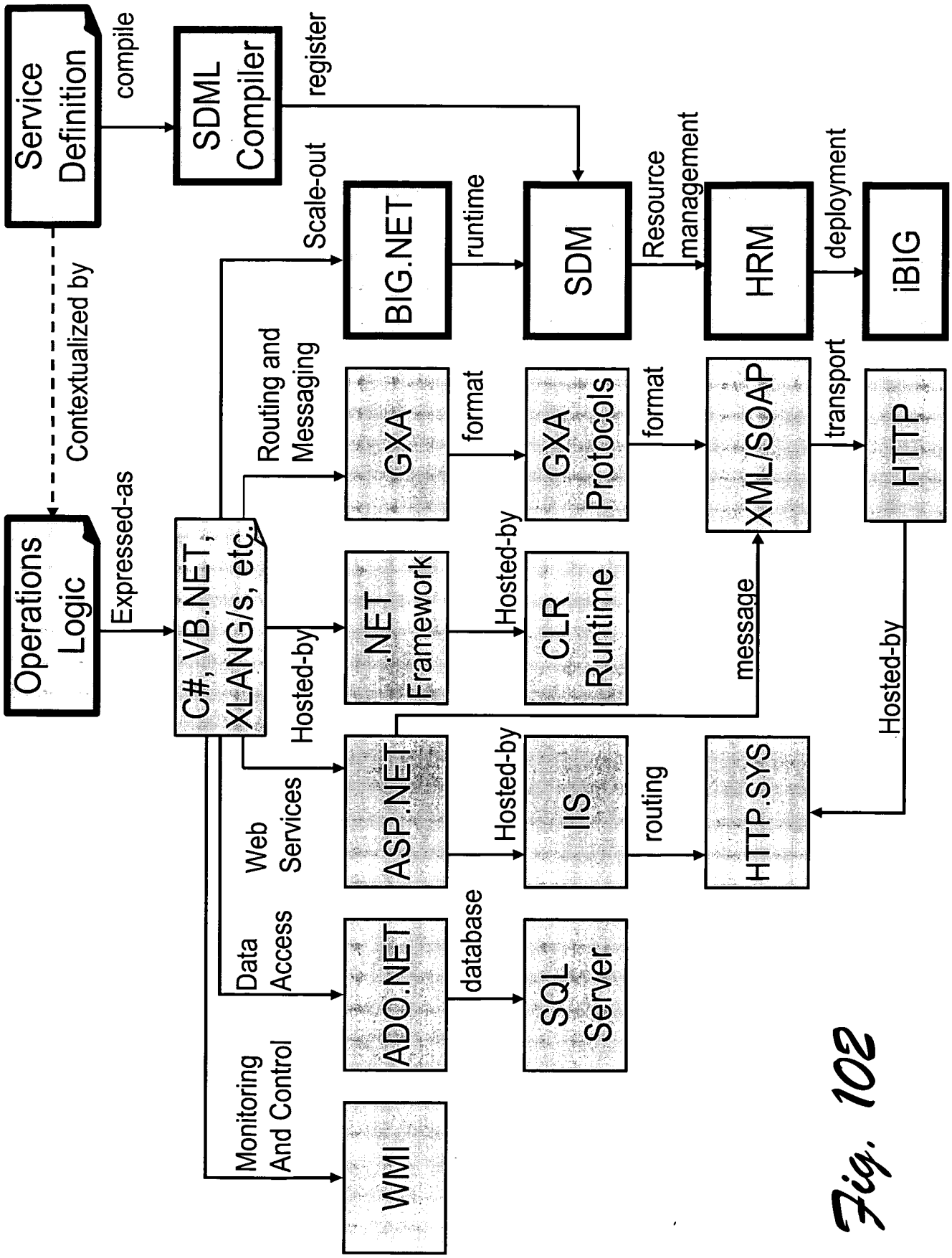
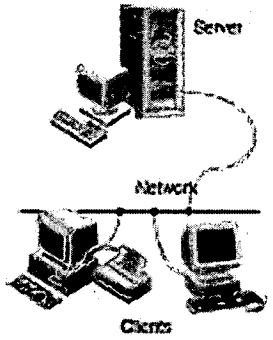

Service Definition
compile
SDML Compiler
register
Contextualized by
Operations Logic
Expressed-as
C#, VB.NET, XLANG/s, etc.
Scale-out
BIG.NET
runtime
SDM
Resource management
HRM
deployment
iBIG
Routing and Messaging
GXA
format
GXA Protocols
format
XML/SOAP
transport
HTTP
Hosted-by
.NET Framework
Hosted-by
CLR Runtime
message
Hosted-by
Web Services
ASP.NET
Hosted-by
IIS
routing
HTTP.SYS
Data Access
ADO.NET
database
SQL Server
Monitoring And Control
WMI

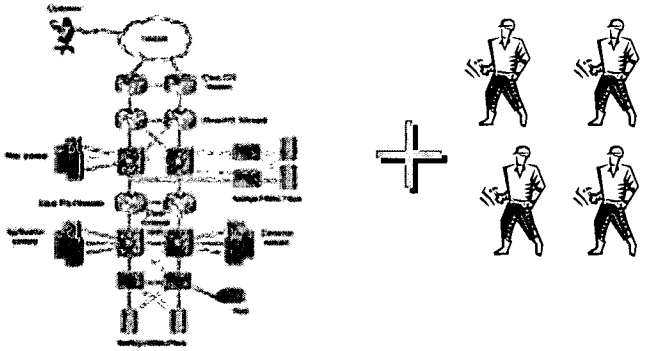
Fig. 102

Yesterday's Monolithic, Single Server Applications



Before Internet

Today's Applications = Services
(SW + Servers/NW/Storage + People)

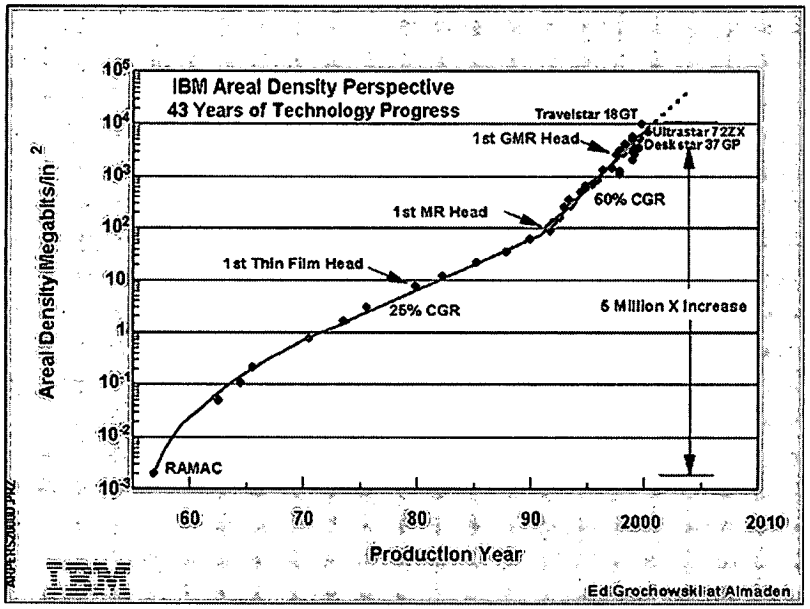


After Internet

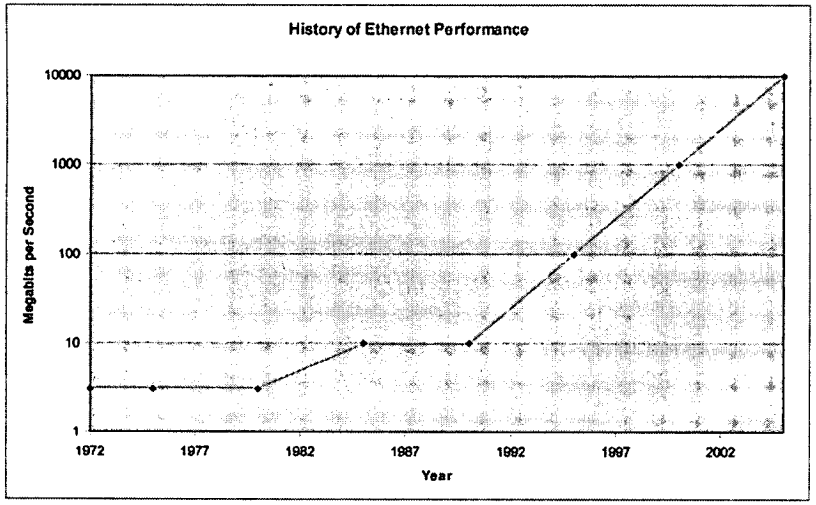
Audience	Small, trusted	Infinite, Potentially hostile
Usage	Constant and Predictable	Unpredictable with much wider variations
Service Level	Low Availability Tolerated	Greatly increase service level expectations

MS1-1494US

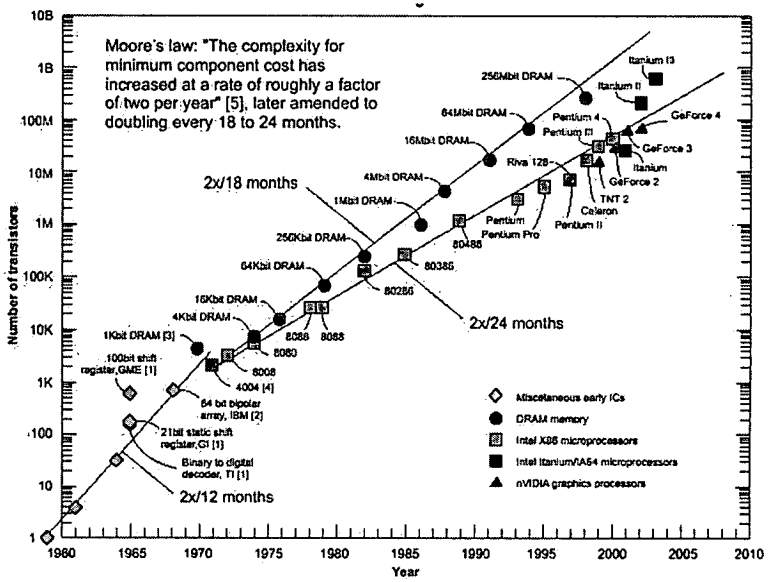
Fig. 103



Denser disks...



Fatter pipes....



[1] Stanley Mazor, "The History of the Microcomputer - Invention and Evolution" http://www.dotpoint.com/xnumber/Microcomputer_Invention.htm.
[2] Bob Dorian and David Pricer, "Pushing the Limits: Looking Forward...Looking Back," Microelectronic Design, Vol. 1., (1987).
[3] "Inventions of the Modern Computer: Intel 1103 The World's First Available DRAM Chip," http://inventors.about.com/science/inventors/library/weekly/aa100898.htm.
[4] Jonathan Cassell, "Who Really Invented the Microprocessor," http://www.ebnonline.com/25year/25_microprocessor2.html.
[5] Gordon E. Moore, "Cramming more components onto integrated circuits," Electronics, Vol. 38, N. 8, Apr. (1965).

More powerful CPUs...

Fig. 104

85% of the cost is driven by people, availability and training

$$TCO_{Service} = People + Downtime + Training + HW/SW$$

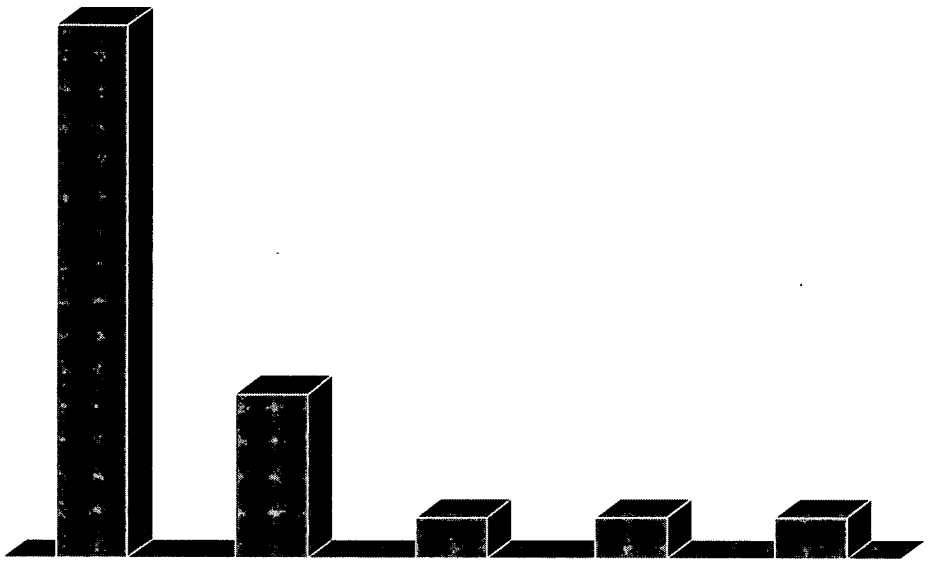


Fig. 105

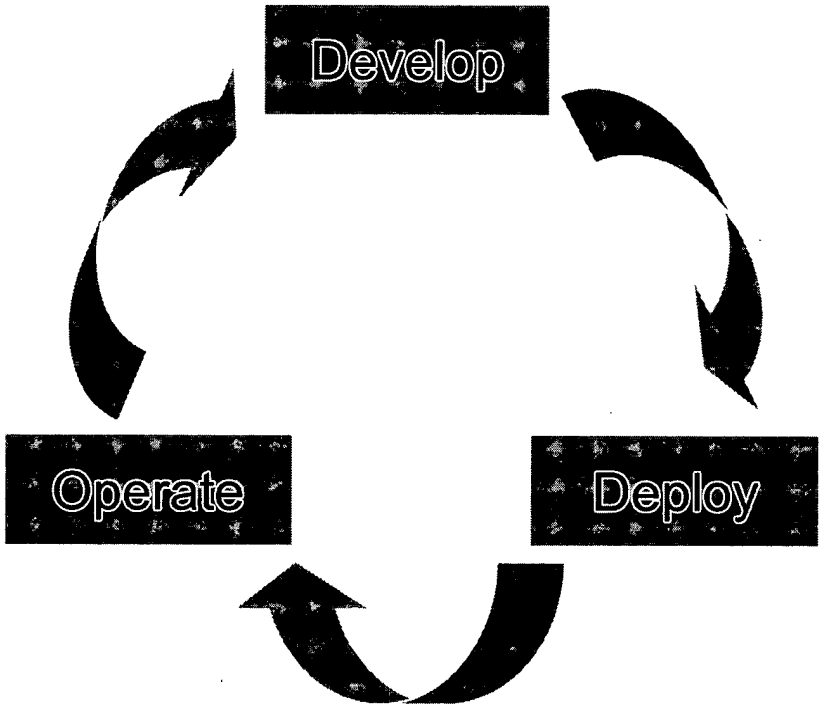


Fig. 106

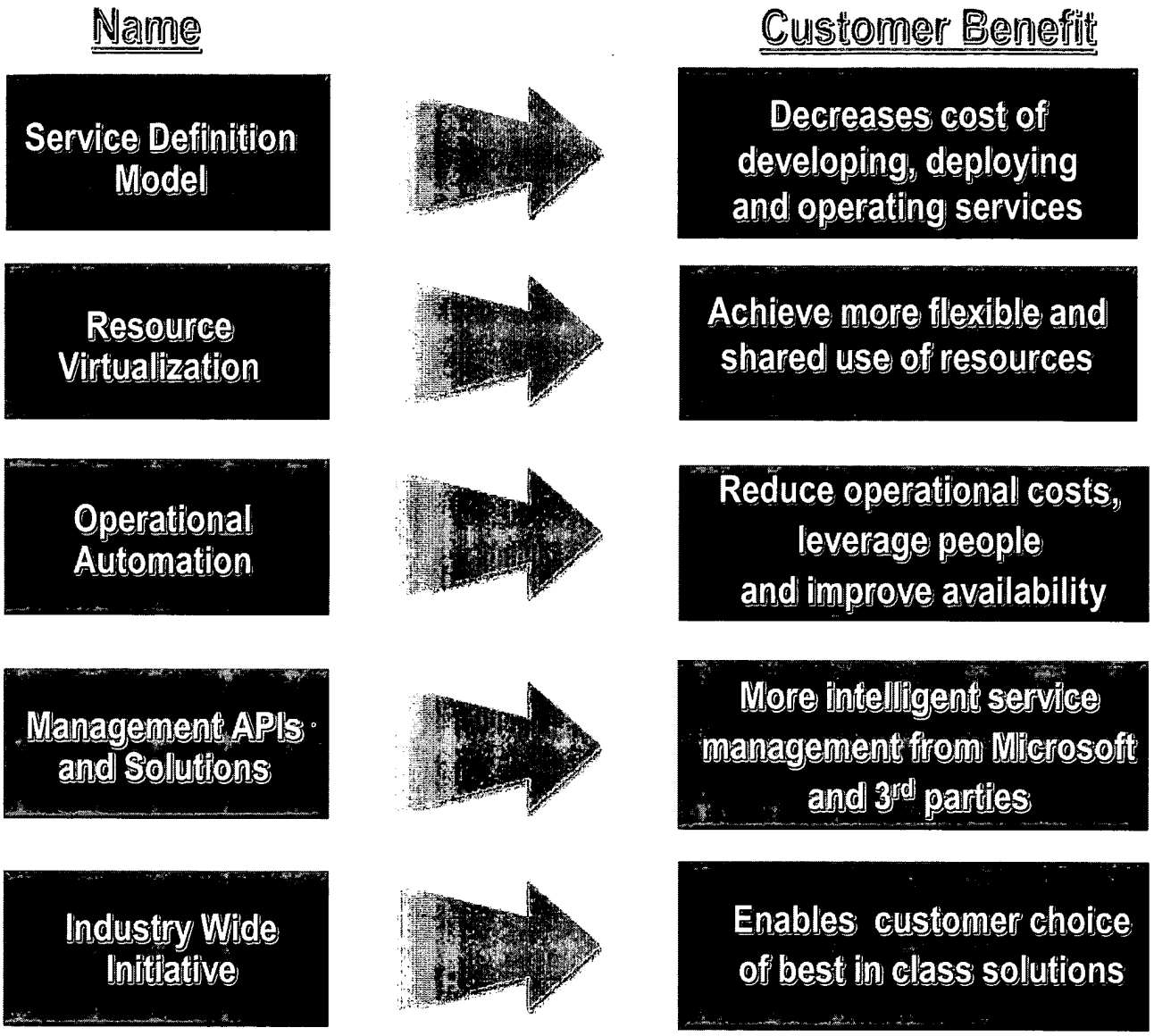

Name
Customer Benefit
Service Definition Model
Decreases cost of developing, deploying and operating services
Resource Virtualization
Achieve more flexible and shared use of resources
Operational Automation
Reduce operational costs, leverage people and improve availability
Management APIs and Solutions
More intelligent service management from Microsoft and 3rd parties
Industry Wide Initiative
Enables customer choice of best in class solutions

Fig. 107

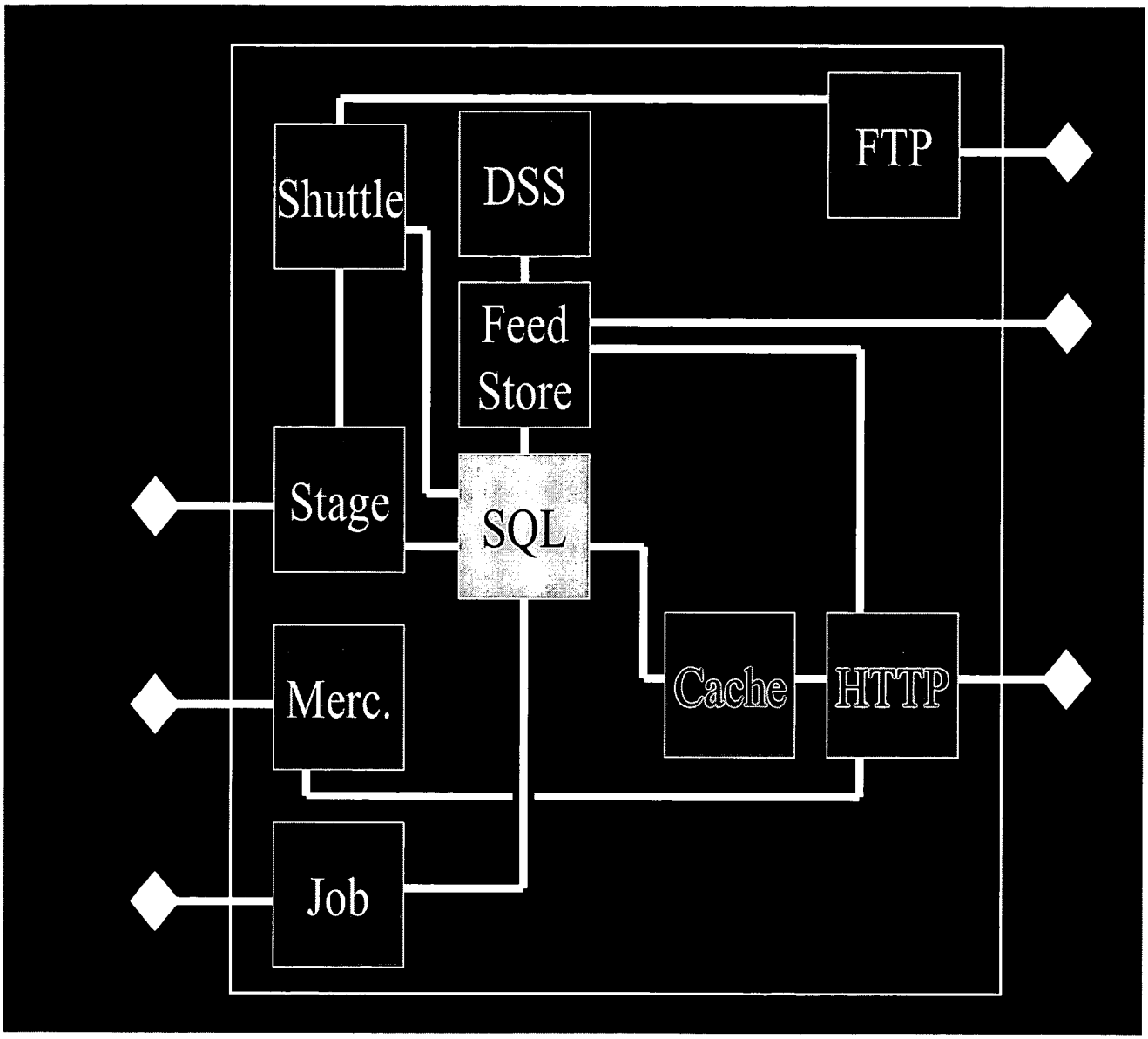


Fig. 108

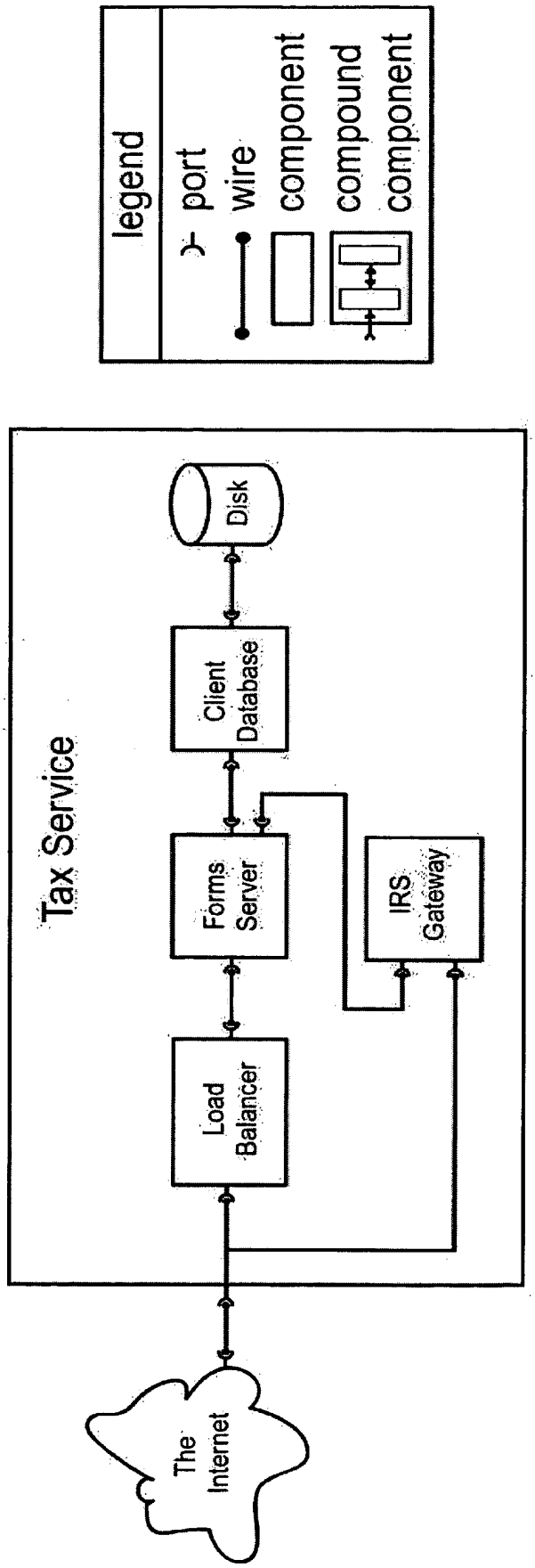

legend
port
wire
component
compound component
Tax Service
Disk
Client Database
Forms Server
IRS Gateway
Load Balancer
The Internet

Fig. 109

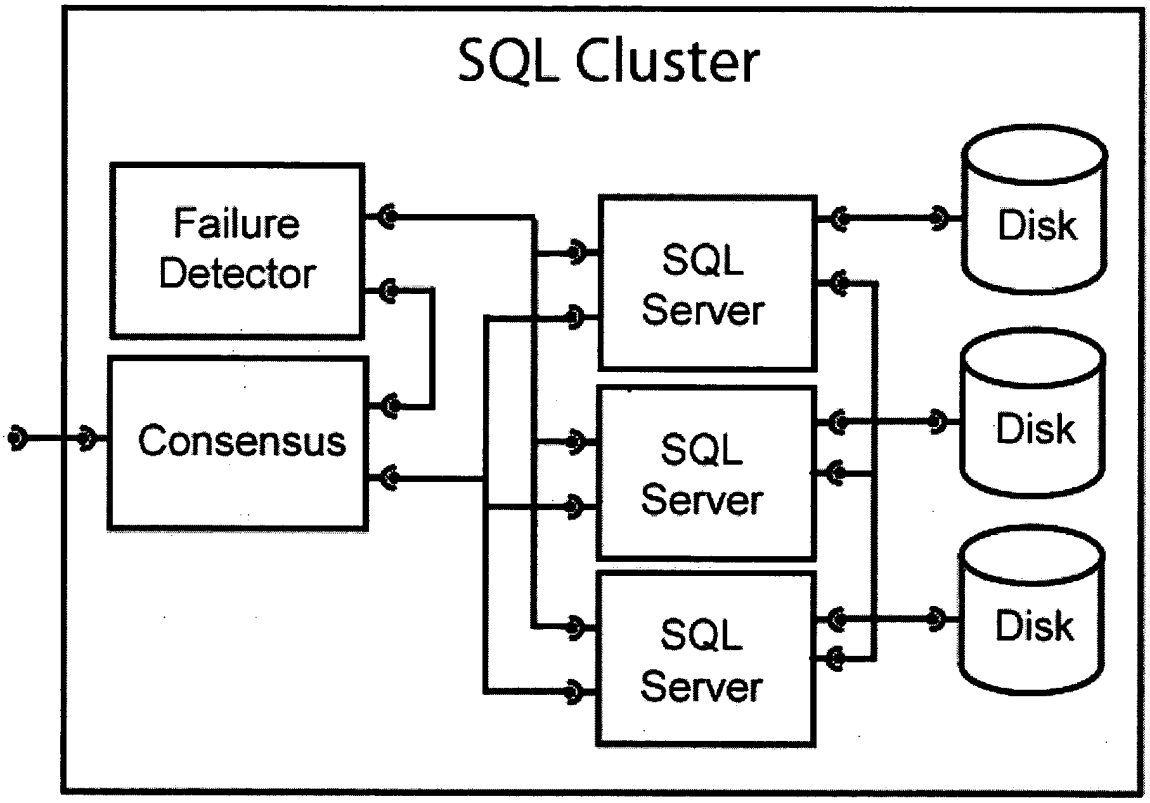

SQL Cluster
Failure Detector
Consensus
SQL Server
SQL Server
SQL Server
Disk
Disk
Disk

Fig. 110

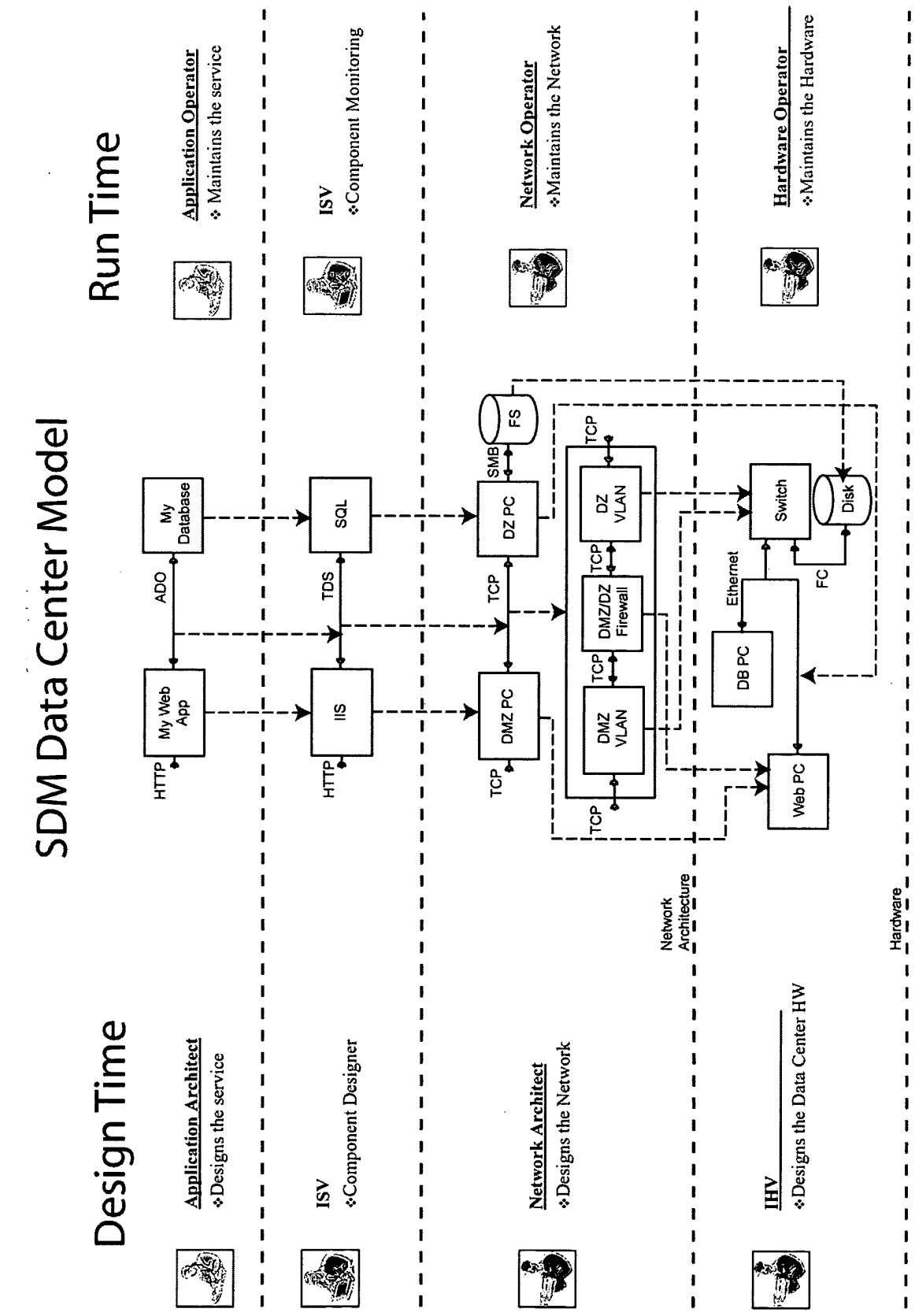

SDM Data Center Model
Design Time
Run Time
Application Architect
Designs the service
ISV
Component Designer
Network Architect
Designs the Network
IHV
Designs the Data Center HW
Application Operator
Maintains the service
ISV
Component Monitoring
Network Operator
Maintains the Network
Hardware Operator
Maintains the Hardware
My Web App
My Database
IIS
SQL
DMZ PC
DZ PC
FS
DMZ VLAN
DMZ/DZ Firewall
DZ VLAN
DB PC
Switch
Disk
Web PC
HTTP
ADO
TDS
TCP
SMB
Ethernet
FC
Network Architecture
Hardware

Fig. 11

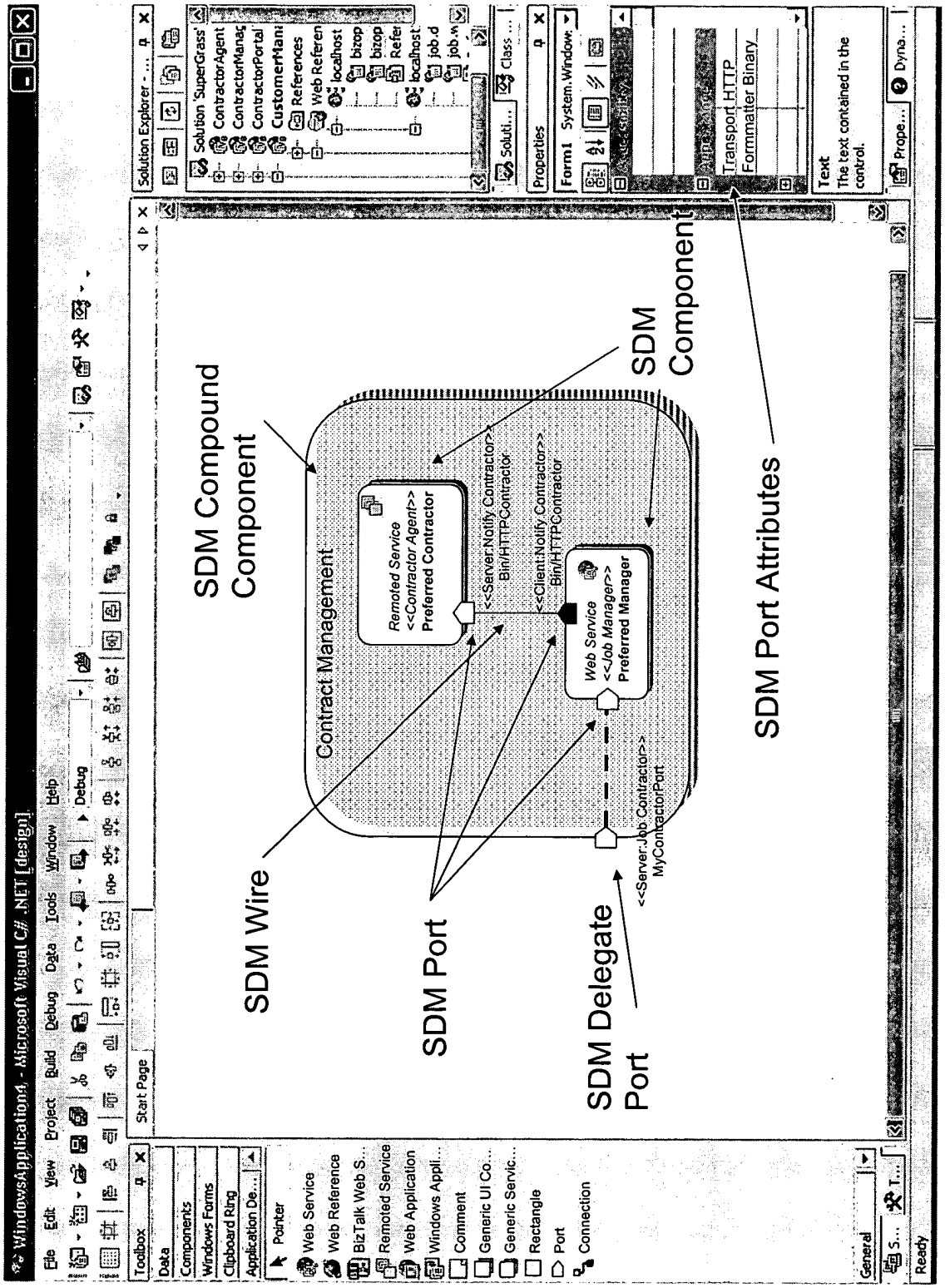

SDM Compound Component
SDM Wire
SDM Port
SDM Delegate Port
SDM Component
SDM Port Attributes
Contract Management
Remoted Service
<<Contractor Agent>>
Preferred Contractor
Web Service
<<Job Manager>>
Preferred Manager
<<Server:Notify Contractor>>
Bin/HTTPContractor
<<Client:Notify Contractor>>
Bin/HTTPContractor
<<Server:Job Contractor>>
MyContractorPort
Transport HTTP
Formmatter Binary
Text
The text contained in the control.

Fig. 112

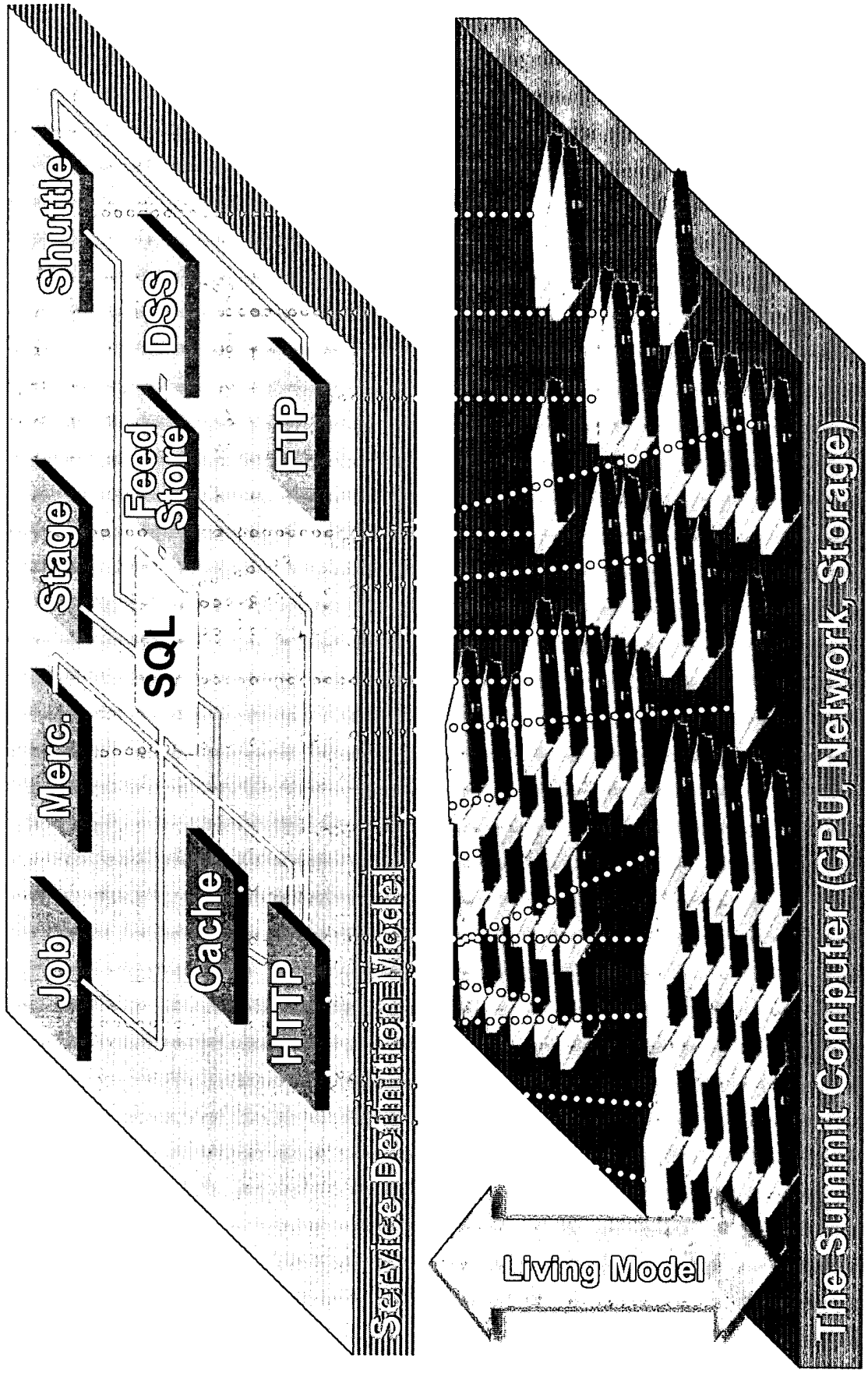

Shuttle
DSS
Feed Store
FTP
Stage
Merc.
SQL
Cache
HTTP
Job
Service Definition Model
Living Model
The Summit Computer (CPU, Network, Storage)

Fig. 113

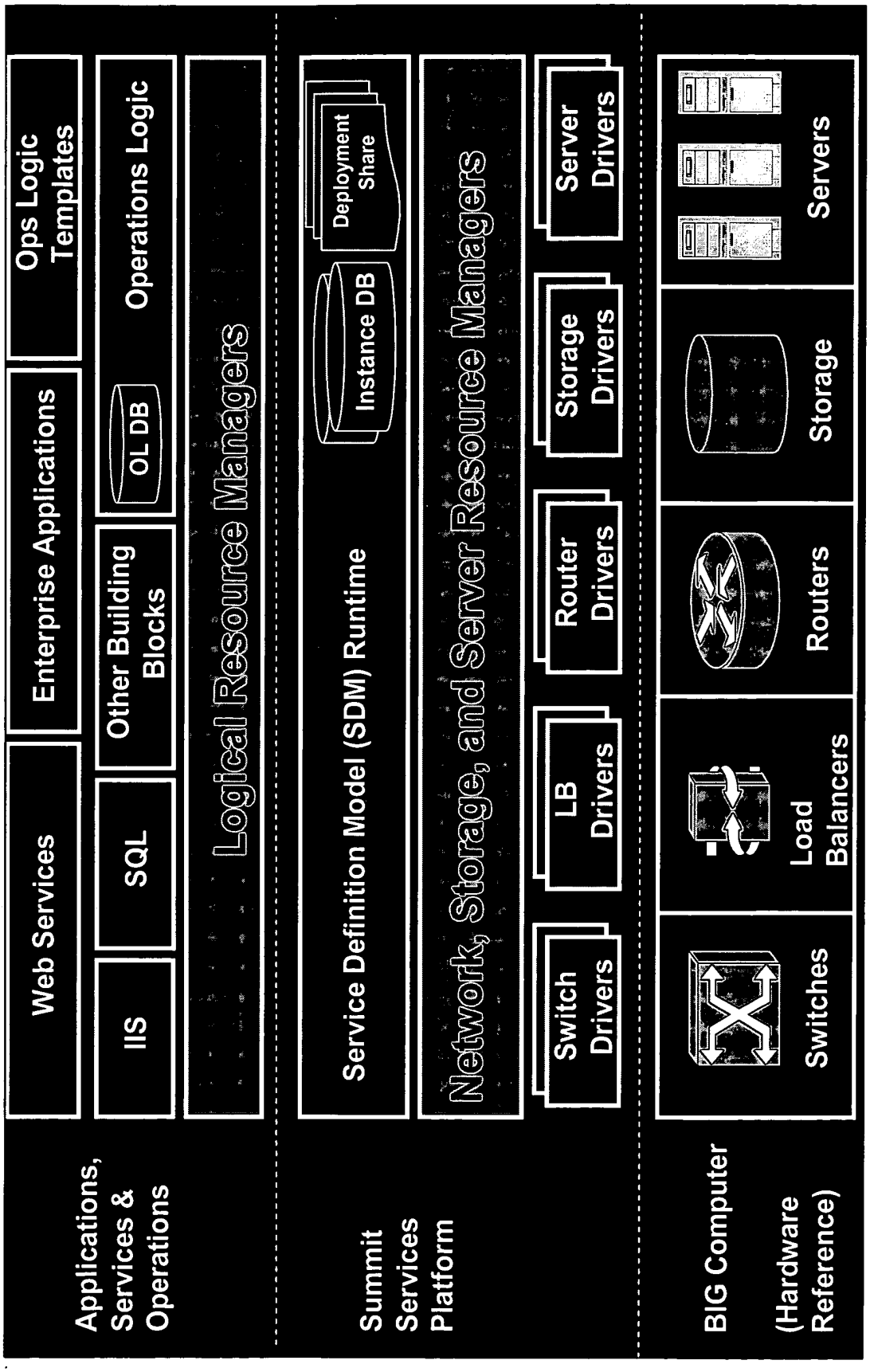

Applications, Services & Operations
Web Services
IIS
SQL
Enterprise Applications
Other Building Blocks
Ops Logic Templates
OL DB
Operations Logic
Logical Resource Managers
Summit Services Platform
Service Definition Model (SDM) Runtime
Instance DB
Deployment Share
Network, Storage, and Server Resource Managers
Switch Drivers
LB Drivers
Router Drivers
Storage Drivers
Server Drivers
BIG Computer
(Hardware Reference)
Switches
Load Balancers
Routers
Storage
Servers

Fig. 114

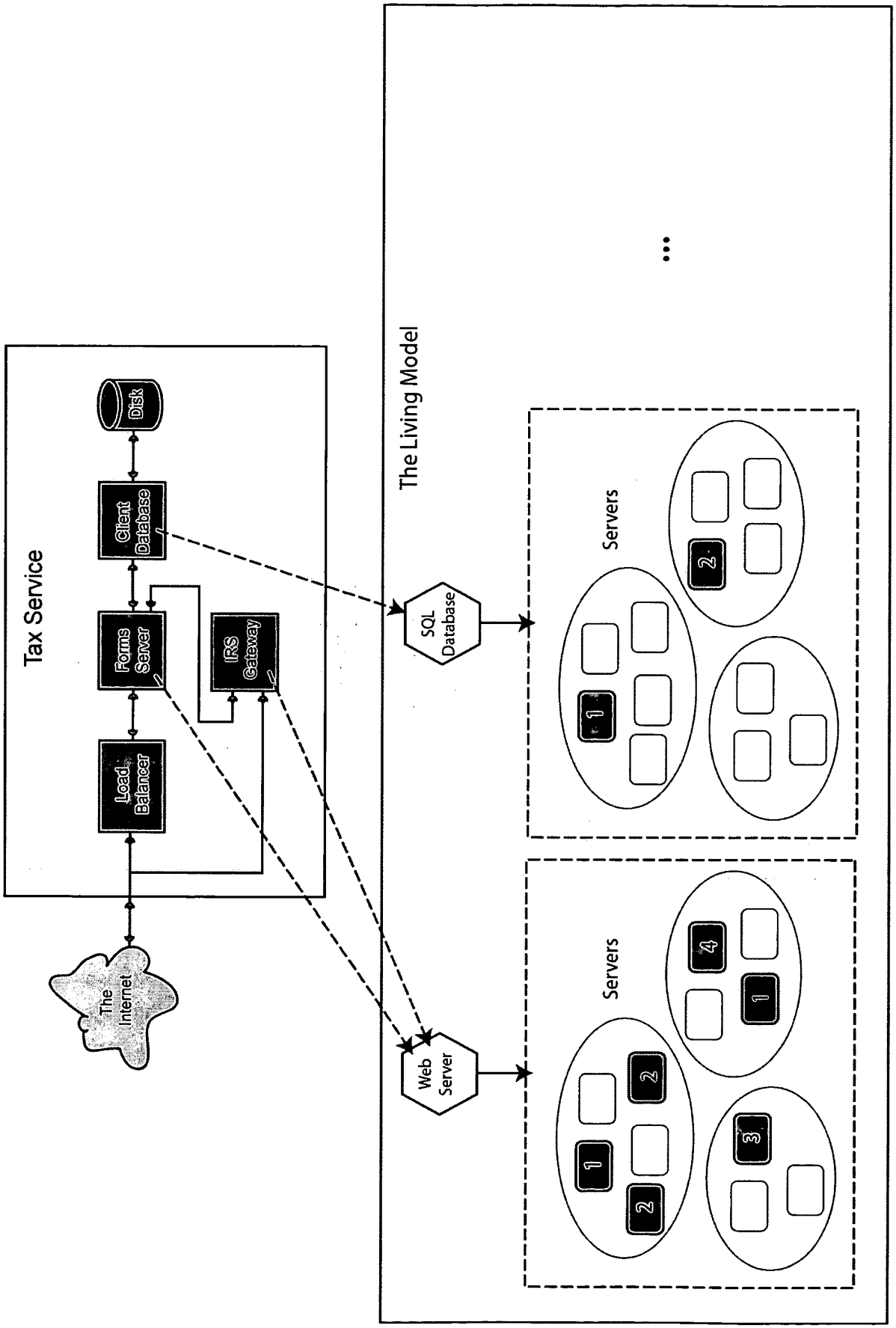

Tax Service
Disk
Client Database
Forms Server
IRS Gateway
Load Balancer
The Internet
The Living Model
SQL Database
Web Server
Servers
Servers
...

Fig. 115

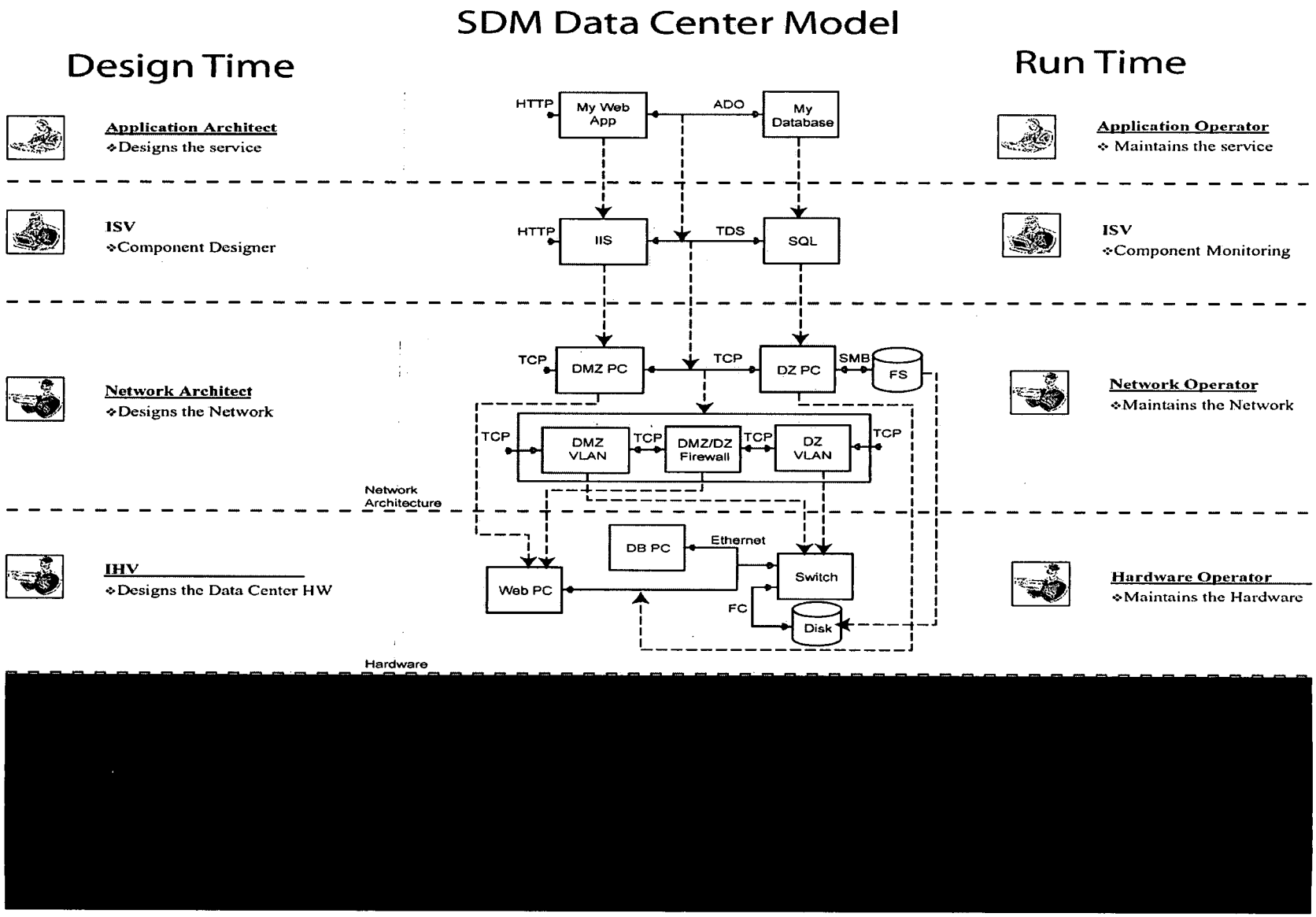


Fig. 116

MS1-1494US

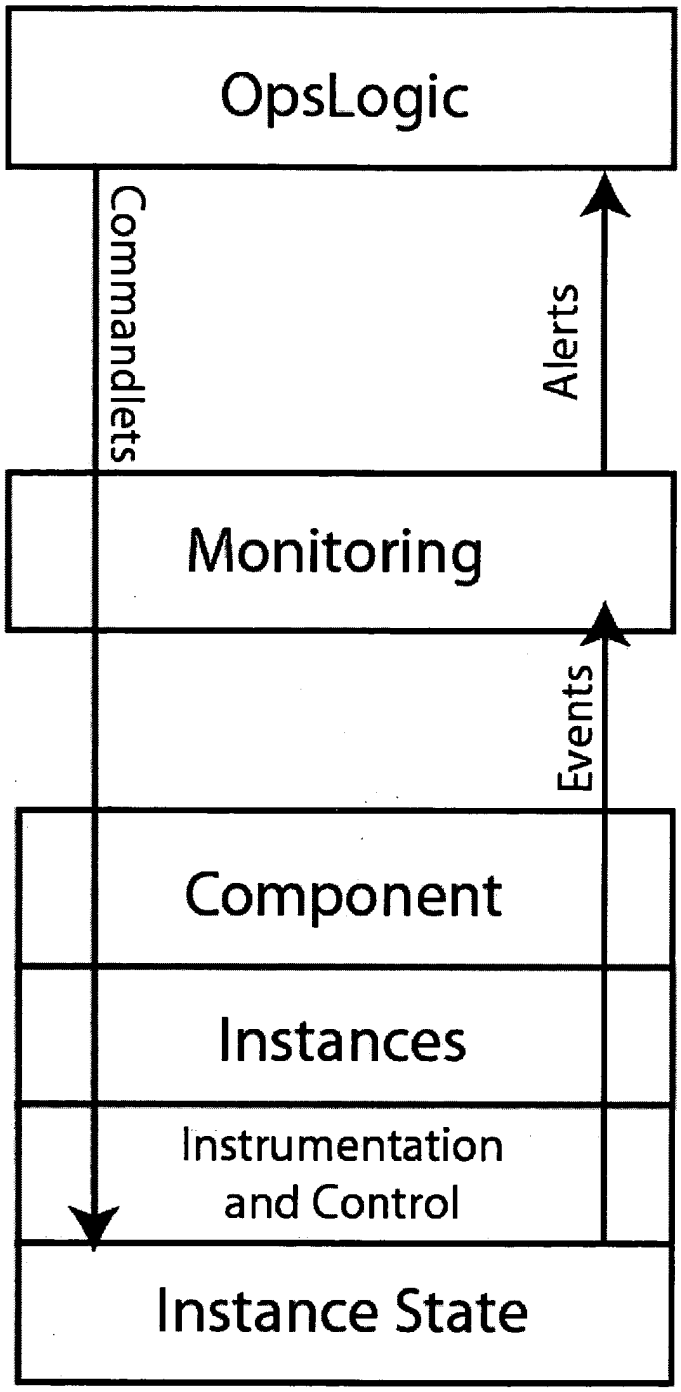

OpsLogic
Commandlets
Alerts
Monitoring
Events
Component
Instances
Instrumentation
and Control
Instance State

Fig. 117

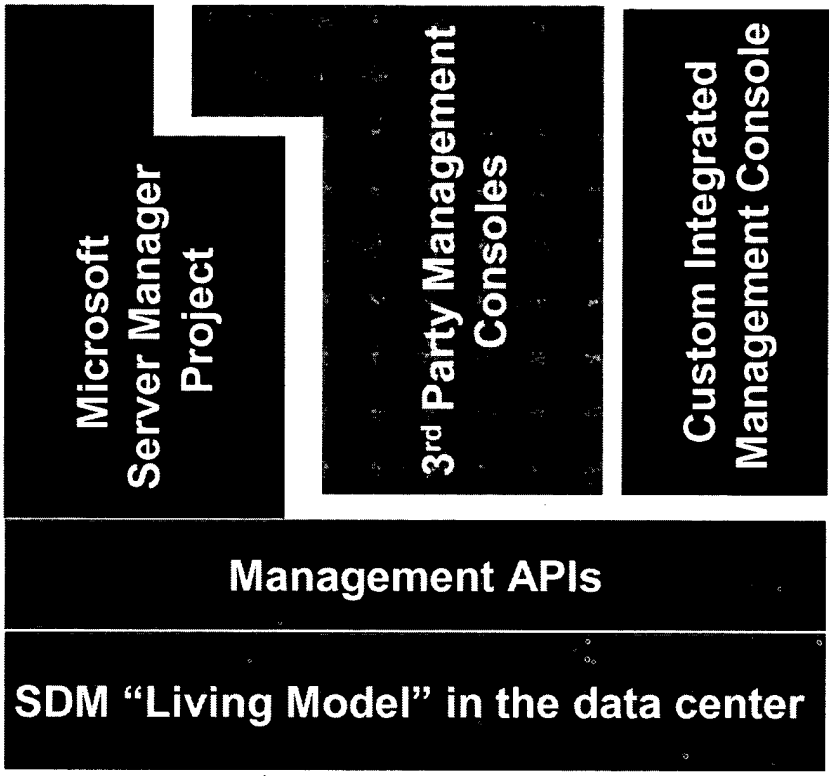

Microsoft Server Manager Project
3rd Party Management Consoles
Custom Integrated Management Console
Management APIs
SDM "Living Model" in the data center

Fig. 118

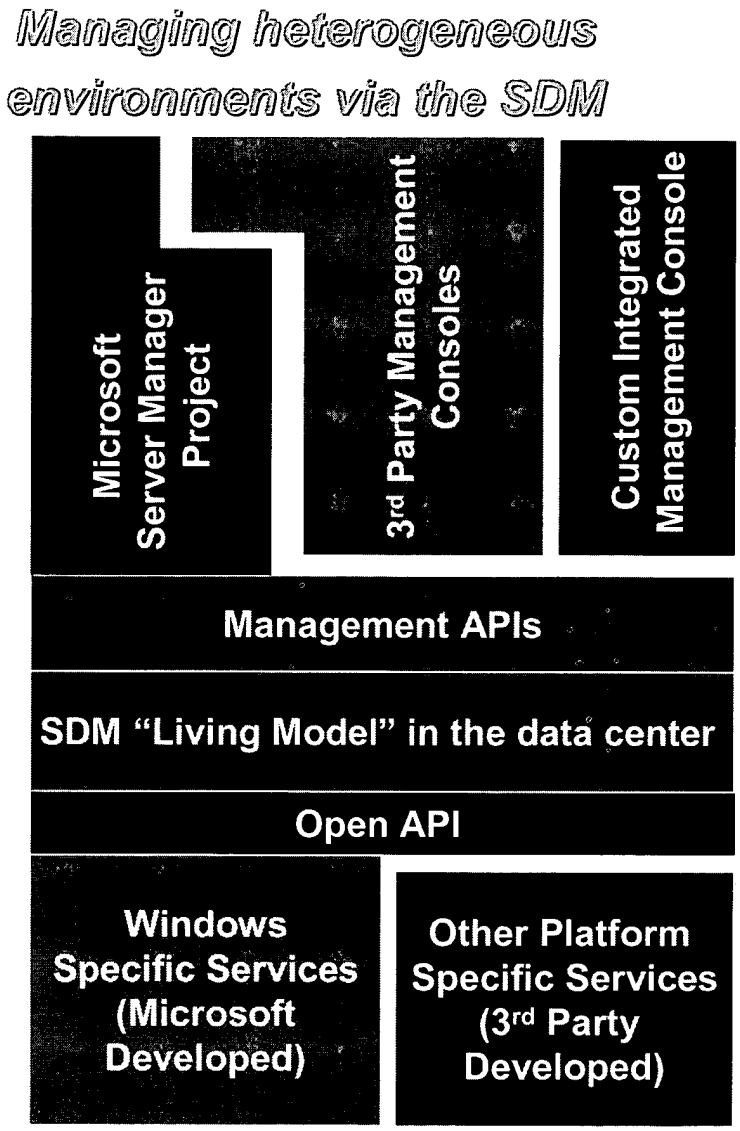

Managing heterogeneous environments via the SDM
Microsoft Server Manager Project
3rd Party Management Consoles
Custom Integrated Management Console
Management APIs
SDM "Living Model" in the data center
Open API
Windows Specific Services (Microsoft Developed)
Other Platform Specific Services (3rd Party Developed)

Fig. 119